



# PROPOSAL FOR A REGIONAL PROJECT/PROGRAMME

## PART I: PROJECT/PROGRAMME INFORMATION

**Title of Project/Programme:** Hydrological Status and Outlook system for integrated water resources management and climate resilience in Bangladesh and Nepal (HydroSOS-BaNe)

**Countries:** Bangladesh, Nepal

**Thematic Focal Area<sup>1</sup>:** Disaster risk reduction and early warning systems

**Type of Implementing Entity:** Multilateral Implementing Entity

**Implementing Entity:** World Meteorological Organization

**Executing Entities:** World Meteorological Organization, Bangladesh Meteorological Department (BMD), Bangladesh Water Development Board (BWDB), Department of Hydrology and Meteorology (DHM) of Nepal

**Amount of Financing Requested:** 12,090,000 (in U.S Dollars Equivalent)

**Project Formulation Grant Request:** Yes  No

**Amount of Requested financing for PFG:** 0 (in U.S Dollars Equivalent)

**Letters of Endorsement (LOE) signed for all countries:** Yes  No

*NOTE: LOEs should be signed by the Designated Authority (DA). The signatory DA must be on file with the Adaptation Fund. To find the DA currently on file check this page: <https://www.adaptation-fund.org/apply-funding/designated-authorities>*

**Stage of Submission:**

This project proposal has been submitted before

This is the first submission ever of the project proposal

In case of a resubmission, please indicate the last submission date: 07 November 2025

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<sup>1</sup> Thematic areas are: Food security; Disaster risk reduction and early warning systems; Transboundary water management; and Innovation in adaptation finance.

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### List of Acronym

Acronym	Full Form
AF	Adaptation Fund

<b>Acronym</b>	<b>Full Form</b>
APFM	Associated Programme on Flood Management
BMD	Bangladesh Meteorological Department
BWDB	Bangladesh Water Development Board
CBFDM	Community Based Floods and Drought Management
CCA	Climate Change Adaptation
CBO	Community-Based Organization
CoP	Community of practices
DHM	Department of Hydrology and Meteorology (Nepal)
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
ESMP	Environmental and Social Management Plan
ESIA	Environmental and Social Impact Assessment
EWS	Early Warning System
E2E-EWS	End to End Early Warning System
ESP	Environmental and Social Policies
FGD	Focus Group Discussion
FFWC	Flood Forecasting and Warning Center
FFGS	Flash Flood Guidance System
GBM	Ganga-Brahmaputra-Meghna
GEF	Green Environment Facility
GHG	Green House Gas
GLOF	Glacial Lake Outburst Flood
HDI	Human Development Index
HKH	Hindu Kush Himalayas
HydroSOS-BaNe	Hydrological Status and Outlook System for Bangladesh and Nepal
IDMP	Integrated Drought Management Programme
INDC	Intended Nationally Determined Contributions
INGO	International Non-Governmental Organization
IPCC	Intergovernmental Panel on Climate Change
IWRM	Integrated Water Resource Management
KII	Key Informant Interview
NAPA	National Adaptation Programme of Action
NAP	National Adaptation Plan
NBS	Nature Based Solutions
NGO	Non-Governmental Organization
NIP	National Implementing Partners
NMHS	National Meteorological and Hydrological Services
NWG	National Working Group
M&E	Monitoring and Evaluation
PPR	Project Progress Report
PMU	Project Management Unit
RCP	Representative Concentration Pathway
RWSG	Regional Working Strategy Group
SAARC	South Asian Association for Regional Cooperation
SOFF	Systematic Observations Financing Facility
UN ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNDP	United Nations Development Programme
USD	United States Dollars
WHOS	World Hydrological Observing System
WMO	World Meteorological Organization

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## Project Background and Context:

### Project Overview

Approximately 1.9 billion people, around one-quarter of the world's total population, live in South Asia. The region includes 216 million people living in extreme poverty, representing 29% of the world's total poor population<sup>2</sup>. South Asian region is amongst the most climate-vulnerable regions, making it further challenging for the sustenance of growth and development. There is a heavy dependence on climate-sensitive livelihoods such as agriculture, fishing, and forestry and the region is experiencing impacts of climate change including flooding, Glacial Lake outburst flood (GLOF), forest fires, soil erosion, and saline water intrusion. A key focus that has received significant prominence in recent times is the effective use of available water resources and its efficient management to withstand impacts of future climatic change and sustain hard-earned development gains. Due to climate change, water resources face multiple stressors, including variable rainfall, rising surface temperatures, population growth, rapid urbanization, and industrialization. At the same time, an effective and integrated water resource management (IWRM) mechanism carries enormous potential for poverty alleviation, reducing impact of floods and droughts, and realization of various water resources projects such as hydropower, irrigation, navigation etc.

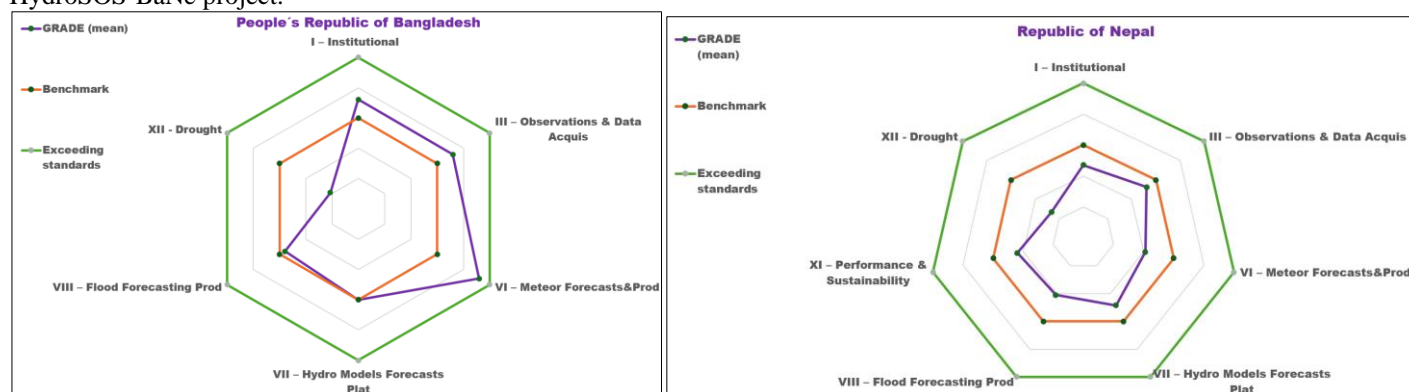
Bangladesh and Nepal cover a major portion of the Ganga Brahmaputra Meghna (GBM) River Basin, which spans over 1.7 million sq. km and has a population of more than 500 million, making it one of the most populated river basins in the world. Both countries face challenges stemming from its socio-economic and ecological context leading to inadequate water resources management. Climate extremes, specifically floods and droughts, are common phenomena with enormous environmental, social, and economic consequences. Despite abundant natural resources, the number of people living under the poverty line and highly vulnerable to climate change events in these two countries are estimated to be around 10 million (ADB, 2019). The monsoon flooding during 2017 in the GBM basin, resulted in ~1200 deaths<sup>3</sup>. In Bangladesh, roughly 80% of the land area is floodplain, with major floods affecting millions of people every six years or so. Nepal, on the other hand, relies on the monsoon system for its agriculture; and significant rainfall variation leads to drought, flood, landslides etc. putting much stress on the country's food distribution system. More than 10 glacial lakes in Nepal are identified as Potentially Dangerous Glacial Lake (PDGL) which may outburst causing floods and endangering human lives with major impact on agriculture, infrastructure, ecosystem and environmental services. Nepal faces a range of water induced hazards including GLOF, landslides, debris flow, riverine flooding, flash floods and urban floods. It experiences increased water availability during the monsoon but scarcity during the winter and pre-monsoon season impacting agriculture that is mostly monsoon dependent. Studies conducted for the GBM region suggest that there will be significant variation in flow and quality of water over a medium to long term with a strong impact on population, water for public use, demand for irrigation, hydropower, industry etc. The overall trend in the GBM region points towards a growing anthropogenic development combined with climatic changes resulting in additional demands on water resources and triggering challenges such as ecosystem degradation, erosion, salinization, water logging, displacements and migration. When water shortages or drought events occur, impacts to agricultural yields, threatening food security and widespread migration across the sub-region can be witnessed.

The prevailing conditions make it imperative that there should be adequate capacity at a regional, national and local levels in terms of technical knowledge and decision making for shared water resources and risk management mechanism for climate extremes. Based on a recent assessment and participative consultations carried out by the World Meteorological Organization (WMO) with National stakeholders from the two targeted GBM basin countries, an immediate need for alternating flood and water shortages monitoring and forecasting systems during the monsoon and dry seasons and associated water resources information are highlighted as critical for a growing economy and population. Other key conclusions highlighted the need to build upon the current context and on-going work to prepare the region for future socio-economic development and environmental change, such as integration of disaster risk reduction measures into the national adaptation and management plans (National Adaptation Plans (NAPs) and National Adaptation Programme of Action (NAPA) identified under the National Determined Contribution's (NDC) for the GBM countries. It therefore calls for innovative frameworks and policies, enhancement of synergy, complementarities and coordination at regional level to foster integrated flood and drought management including ecosystem based adaptations, availability of standardized interoperable Hydro-meteorological data, especially on real time basis, coordination of information channels and procedures for end-to-end early warning systems, and

<sup>2</sup> [https://worldbank.github.io/SARMD\\_guidelines/poverty-measures.html](https://worldbank.github.io/SARMD_guidelines/poverty-measures.html)  
<sup>3</sup> <https://iopscience.iop.org/article/10.1088/1748-9326/ab10ee/meta>

increase in knowledge availability among community members on social-economic and environmental risks and their participation in decision making.

During the proposal development phase, WMO conducted an initial assessment for the two targeted countries to understand the National Meteorological and Hydrological Services (NMHSs) current capacities, gaps and needs for the strengthening of the end-to-end flood and drought forecasting and early warning system (preliminary assessment reports are available here [Bangladesh](#) and [Nepal](#)). The initial findings, illustrated through the spider graph below, indicate limited capacities (as shown by the purple graph not reaching the benchmark) and highlight the need to enhance the entire value chain of flood and drought forecasting and early warning systems. The objective is to raise the purple graph to meet or exceed the benchmark represented by the orange points. This gap is being addressed through the HydroSOS-BaNe project.



There is a need for improving and complementing the adaptation plans, guidelines and policies on the climate-based threats especially for floods and drought events in GBM countries such as Bangladesh and Nepal. At the national level, both countries have developed climate change adaptation action plans and strategies, or are in the process of implementing NAPs, NAPA enhancing the climate change adaptation efforts of national agencies and their communities. Furthermore, both countries have listed activities on IWRM, early warning and climate adaptation in their intended nationally determined contributions (INDCs). The main areas for INDCs listed by the two GBM riparian countries are summarized in Table 1, covering topics closely related to the major fields of the HydroSOS-BaNe project. The countries are dedicated to finding support for achieving these targets.

Table 1: INDC areas of the GBM countries

INDC Contribution to	GBM project countries	Bangladesh	Nepal
Surface Water Use and Rainwater Harvesting		☒	☒
Water Resources Management		☒	☒
Flood management		☒	☒
Agriculture and Food Security		☒	☒
Disaster Management		☒	☒
Capacity Building and Strengthening of relevant stakeholders		☒	☒

Source: <https://unfccc.int/NDCREG>

## Geographical Context

The GBM river basin is located between latitudes 21°25'N and 31°50'N, and longitudes 73°25'E and 98°75'E. (Figure 1). It is a transboundary river basin spanning an area of 1.7 million sq. km., distributed among five countries: Bangladesh (7%), Bhutan (3%), China (18%), India (64%) and Nepal (9%)<sup>4</sup>. The GBM basin is the third largest freshwater outlet to the ocean, and each of its three main rivers has important tributaries, some of which are transboundary. These three main rivers converge a few hundred km. upstream in Bangladesh before flowing into the Bay of Bengal.

Both the Ganga and Brahmaputra rivers originate in the Himalayan Mountain Range. The Ganga River emerges from the Gangotri Glacier and joins the Bay of Bengal after traversing approximately of 2758 kilometers. The Brahmaputra River, known as Yalung Zangbo in China, originates on the northern slopes of the Himalayas, and after flowing through India, enters Bangladesh, where it is called Jamuna.

It traverses a total length of 2260 km<sup>5</sup> and both the Ganga and the Brahmaputra join within the Sundarbans of Bangladesh.

The tributaries of the Meghna River originate in the mountains of eastern India. A prominent example is the Barak River. These tributaries flow southwest into Bangladesh, joining the Ganga and the Brahmaputra Rivers. As a result of this confluence, a large delta is formed, covering about 80% of Bangladesh and part of Bengal (India) before they flow together into the Bay of Bengal.

<sup>4</sup> FAO, 2011. AQUASTAT Transboundary River Basins – Ganges-Brahmaputra Meghna River Basin. Food and Agriculture Organization of the United Nations (FAO). Myanmar not included in the list of countries here has approx. 100 sq. km. of the upper Meghna River with around 300 residents (World Bank 2015).

<sup>5</sup> Sharma et al. 2021. Climate Change detection and attribution in the GBM River Basin. Geoscience Frontiers. <https://doi.org/10.1016/j.gsf.2021.101186>

As shown in Figure 1, the GBM basin exhibits distinct climatic characteristics, resulting from monsoon variability and unique topography. For example, it includes elevation up to 8848.86m in the upper Himalayan region and the plains of the Ganges, Terai, Northeast India and Bangladesh. Mount Everest, the highest peak in the world and Cherrapunji the second wettest place, are part of the GBM region. Most of the river systems in the basin lies within the monsoon belt, where annual rainfall ranges from 250 to over 4000 mm annually. The unique topographic features of the GBM basin alters monsoonal flow, shaping spatial distribution of precipitation. For example, it results in higher rainfall in the mid mountains-southern foothills of Nepal, Northeast part of India close to Bangladesh, while the leeward side receives considerably less precipitation. The Ganga basin is known for high snowfall in the upper Himalayan region, high precipitation in the middle mountain range and plains of the Ganges with very low precipitation in the northwest upper region, and very high precipitation downstream closer to the deltaic areas in Bangladesh. The Brahmaputra basin has both high precipitation zones and dry rain shadow areas, whereas the Meghna River basin experiences the world's highest precipitation levels. The delta region experiences strong cyclonic weather both before and after the monsoon season. The winter precipitation is mainly through the Western disturbances and Indian Monsoon alone accounts for 60-90% of the annual total rainfall in the GBM basin. The temperature as a function of altitude varies from 40 degree C in the plains of Bangladesh during summer to minus 30s degree C in the upper Himalayas.

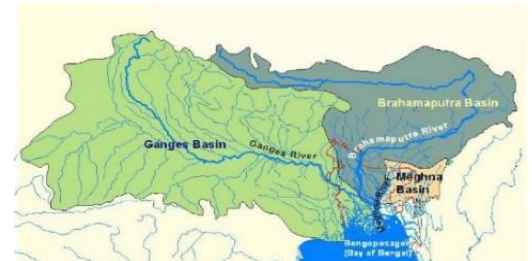


Figure 1 GBM basin map [https://www.researchgate.net/figure/Ganges-Brahmaputra-Meghna-GBM-Basin\\_fig2\\_326831987](https://www.researchgate.net/figure/Ganges-Brahmaputra-Meghna-GBM-Basin_fig2_326831987)

**Table 2: GBM Basin Area within Countries<sup>6</sup>**

Country	Ganges basin		Brahmaputra basin		Meghna basin	
	Basin area (1000 km <sup>2</sup> )	Percentage of total area	Basin area (1000 km <sup>2</sup> )	Percentage of total area	Basin area (1000 km <sup>2</sup> )	Percentage of total area
China	33	3	293	50		
Nepal	140	13				
Bhutan			45	8		
India	861	80	195	34	49	58
Bangladesh	46	4	47	8	36	42
<b>Total</b>	<b>1,080</b>	<b>100</b>	<b>580</b>	<b>100</b>	<b>85</b>	<b>100</b>

## Flood and Drought situations in the two GBM Basin Countries

### Bangladesh

The landmass of Bangladesh is formed due to the process of sedimentation of the GBM river system, and it is mostly flat terrain except the north-east and its south-east region. Bangladesh receives 72% of its rainfall during the southwest monsoon, with average rainfall being approx. 2300 mm. It experiences four types of floods: flash flood, rain-fed, riverine flood, and flood due to cyclonic storm surges. Around 25-30% of the country reports flooding each year. Between 1954 and 2020, Bangladesh experienced eight major floods, of which the 1998 flood was the most severe, inundating nearly 68% of the country. The country receives large quantities of runoff sediments which makes riverbank erosion a major challenge. In addition, drought is a major concern. Over the past five decades, Bangladesh has experienced 20 severe droughts, with a significant impact on its water and food security<sup>7</sup>. The northern region, which is the country's food basket is also the most impacted from drought occurrences. Moreover, the north-western part of the country, currently recognized as a drought hotspot, faces severe water scarcity during the dry season, particularly for domestic and agriculture use. In recent times, major droughts events occurred in 1995, 2000, 2006 and 2009.

### Nepal

Nepal covers most of the Himalayan Mountains or peaks and being a water abundant country experiences frequent flooding. Lately it is suffering from increasing instances of localized drought as well under the effect of climate change. Nepal carries other hazard risks such as landslides, GLOF, urban floods etc. The country receives about 80% of its total rainfall during the monsoon (June-September) period. During the monsoon, flash floods are often a major hazard with 70% of the settlements located within drainage basins. The country has experienced several glacial lake outbursts flood (GLOF) in the past. There are 2070 glacial lakes with size >0.03km<sup>2</sup> in Nepal, out of which 21 are identified as potentially dangerous for GLOF. In addition, there are 26 potentially dangerous glacial lakes located in China (25) and India (1), which could have a flooding impact in Nepal and downstream, if GLOF occurs. Major GLOF incidents in recent times include Bhotekoshi (2016) which damaged the headworks of Bhotekoshi Hydropower Project (45 MW) and the Barun River (2017) which caused flooding and debris flow in the Makalu Barun National Park area. In addition to GLOFs, the river blockage due to landslides and debris flows causes formation of artificial dams and subsequent Landslide Dam Outburst Flood (LDOF) causing significant impact on downstream settlements and infrastructure. The Melamchi flood (2021) is one example of the cascading effect of GLOF, LDOF and heavy rainfall. The flooding in 2019 affected most of the districts of Terai and caused 90 deaths, and USD 584.6 Million damage to infrastructures and services<sup>8</sup>. There are increasing incidents of prolonged droughts with consequent risk for forest fires, agricultural losses, biodiversity losses, etc.

### GBM Region

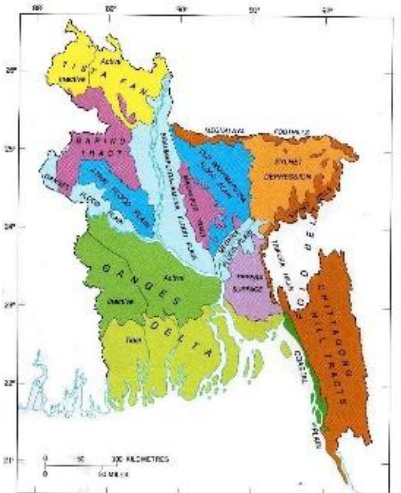


Figure 2: river basins covering Bangladesh region.

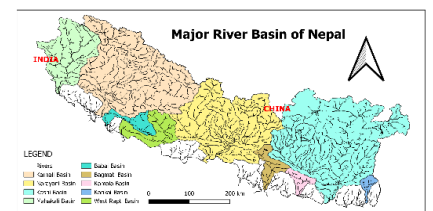


Figure 3: Major River basins of Nepal

<sup>6</sup> Salehin, Mashfiqus & Khan, M Shah Alam & Prakash, Anjal & Goodrich, Chanda. (2011). Opportunities for Transboundary Water Sharing in The Ganges, The Brahmaputra and The Meghna Basin.

<sup>7</sup> Islam, S.M.S; Islam, K.M.A; and Mullick, M.R.A. 2022. Drought hot spot analysis using local indicators of spatial autocorrelation: An experience from Bangladesh. *Environmental Challenges*, 6. <https://doi.org/10.1016/j.envc.2021.100410>

<sup>8</sup> [https://un.org.np/sites/default/files/doc\\_publication/2018-11/FRNA\\_Report\\_Final.pdf](https://un.org.np/sites/default/files/doc_publication/2018-11/FRNA_Report_Final.pdf)

The GBM basin is identified as the most flood prone basin. Bangladesh and Nepal receive an average annual precipitation of 2200 mm and 1600 mm respectively; with floods, drought and landslides being its major concerns. Flood during and after monsoon often disrupt lives and livelihoods. In 2021, at least three major floods were reported in Nepal. Two of these occurred in June 2021, the first was a flash flood which occurred in the rain shadow northern region (Manang District) and the second, known as Melamchi disaster, was a result of intense rainfall combined with glacier deposition dislocation and landslide dam outbursts resulting in flash flood and debris flow affecting the Melamchi water supply project. The third flood incident occurred during the Post Monsoon period in October 2021 and caused widespread damage to the farm sector and caused agricultural losses estimated at 10 million USD.

### Risk hotspot

The GBM is one of the risk hotspots in South and Southwest Asia (as shown under Figure 4) where disaster risk areas converge with poverty, population density and a low human development index. More than one third or 34.55 % of the total population in the GBM basin are at the risk of flood exposure (UN ESCAP 2020). The region exhibits the flood-drought syndrome, as the rivers flood during the monsoon, but become much more drier during the remaining months, causing seasonal water scarcity. A relationship has been observed between floods in the GBM basin and El Niño Southern Oscillation. For example, six of the seven most devastating floods have occurred during La Niña years.

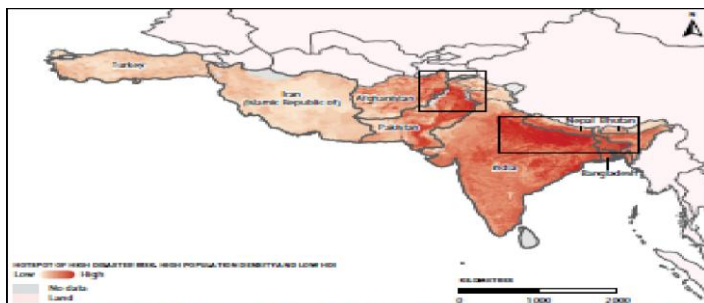


Figure 4: Risk hotspots of GBM basin

### Socio-Economic Context

The estimated population living in the GBM region exceeds 500 million, 70% of whom live in rural areas, making this one of the world's largest pockets of poverty<sup>9</sup>. Population density is high. For example, when compared with Africa, the latter is 18 times bigger in size with a population less than twice that of the GBM region. The intra-basin population density, however, varies significantly; for example, the lowest density is reported from China 6 per sq. km. followed by Bhutan 18, Nepal 195, India 432 and Bangladesh, which has the highest density 1013 number of people per sq. km. The two targeted countries falling within the basin; Bangladesh and Nepal are ranked between 129 and 143 in the global Human Development Index (HDI): a composite measure of average achievement in key parameters of a long and healthy life, education, and standard of living (UNDP 2020). The intra-basin comparison shows that only 0.79% of the population has a high HDI whereas 32.5 % fall within low and medium HDI. The vast majority of people depend on agriculture for their livelihood. Administratively, Nepal is divided into 7 Provinces, 77 Districts, 753 Local Levels (293 Municipalities and 460 Rural Municipalities). Administratively, Bangladesh is divided into eight Divisions (namely: Dhaka, Mymensingh, Sylhet, Rajshahi, Chittagong, Khulna, Rangpur and Barisal), 64 districts, 492 Upazila (Sub-districts) and 4554 Unions (group of villages).

**Table 3: Socio-Economic Conditions of GBM Countries<sup>10</sup>**

Socio Economic Indicators	Bangladesh	Nepal
Estimated Population	169,828,911	29,164,578 (2021)
Population Annual Growth Rate between 2022-2023	1.11%	0.92% (2011-2021)
Population below National Poverty Line (In Percentages)	~24.3%	15.1%
GDP Per Capita (US Dollar) - 2021	1,910 USD	1,399 USD
Literacy rate - 2019	74.68%	76.2% (2021)
Life expectancy	72 years	70 years
Human Development Index	0.661	0.602
Global Gender Gap <sup>11</sup>	0.714 (71st)	0.692 (96th)
Annual Freshwater Withdrawal for Agriculture (Billion Cubic meters) <sup>12</sup>	9.5	35.9
Per Capita Energy Use (including all types of energy)	468 gigajoules (GJ) /yr	21.45 GJ per year or 5.96 MWh /yr

<sup>9</sup> UN ESCAP (2020). The Disaster Riskscape across South and South-West Asia [The Disaster Riskscape across South and South-West Asia: Key Takeaways for Stakeholders](https://www.unescap.org/publications/the-disaster-riskscape-across-south-and-south-west-asia-key-takeaways-for-stakeholders) (unescap.org)

<sup>10</sup> Rasul, G. 2015. Water for growth and development in the Ganges, Brahmaputra, and Meghna basins: an economic perspective, International Journal of River Basin Management, 13:3, 390. DOI : 10.1080/15715124.2015.1012518

<sup>11</sup> [https://www3.weforum.org/docs/WEF\\_GGGR\\_2022.pdf](https://www3.weforum.org/docs/WEF_GGGR_2022.pdf)

<sup>12</sup> <https://data.worldbank.org/indicator/ER.H2O.FWTL.K3?end=2020&locations=NP&start=2020&view=bar>

**Environment and Ecosystem Context:**

Ecosystem services such as food production, water quality for biotic organisms, purification of water etc. are increasingly under stress in major basin areas across the world including the GBM. Processes supporting these ecosystem services have developed over thousands of years, and the interconnected nature of its various components is such that effects in one region or area influence services across the basin.<sup>13</sup> In addition to biophysical factors operating at different scales, a variety of social processes attenuate or reinforce impacts, and together these have bearing on sustenance of ecosystem services. Figure 5 illustrates the interconnectedness of global scale effects, such as sea level rise and climatic change, with regional and local scale effects alongside social factors. The GBM basin's river flow, water elevation, damming, embankments, flooding, salinization, subsidence, loss of mangroves, fisheries etc. are closely intertwined with population growth, land use, poverty, migration, livelihood etc. Bio-physical factors and social factors influencing ecosystem services in the Delta region (Source: Nicholls et al., 2016)

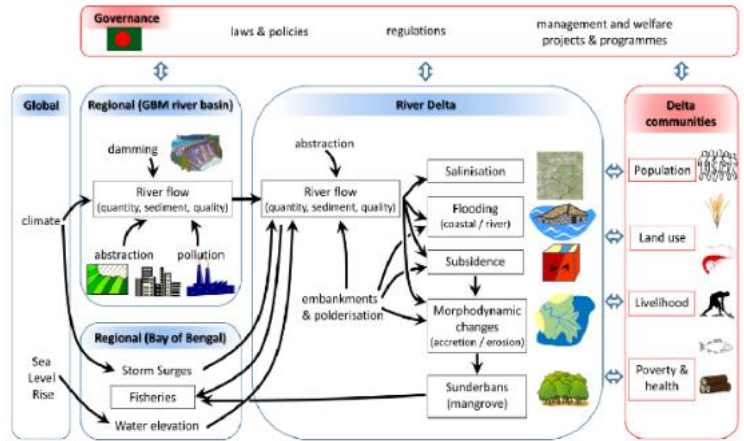


Figure 5 Interconnectedness of global scale effects on climate change

**Water related Development in Bangladesh and Nepal**

The GBM region carries immense potential for development through water resources for example, irrigation, dams, hydropower etc. The practice of irrigation through flood water, canals date back to historical times, and these practices are mentioned in mythological texts and scriptures. It was further developed from the 12th century onwards, and subsequently by the British during the colonial period or mid-19th to mid-20th century. The estimated irrigated area in the GBM basin is around 35 million ha which includes groundwater and surface-water irrigation.

The distribution among the two targeted nations is as follows: Bangladesh (14%), and Nepal (3.3%)<sup>14</sup>. The potential for gravity irrigation system in Bangladesh is quite limited mainly due to its flat topography and instability of rivers (flow measurements in GBM river basin are provided under Figure 6). In 2008, the total irrigation coverage in Bangladesh was 5.05 million ha of which 4.93 million ha were located in the GBM region. 75% of it is groundwater while the remaining is surface irrigation. Nepal fully located within the Ganga basin had an estimated 1.5 million ha irrigated area out of which 75% was surface water and the remaining ground water. The GBM basin has a number of dams, constructed for irrigation and hydro-power purposes. Nepal has only one storage hydropower project with storage capacity of 85 million m<sup>3</sup>. Nepal hydroelectricity accounts for more than 96% of the total country's electricity generation. A number

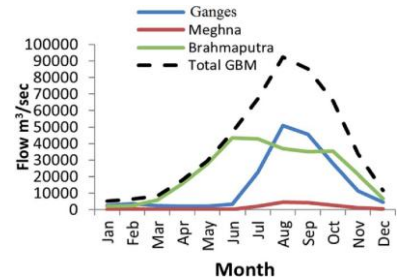


Figure 6: Flow measurements in GBM river basin

**Large dams in the Ganges-Brahmaputra-Meghna river basin**

Country	Name	Nearest city	River	Year	Height (m)	Capacity (million m <sup>3</sup> )	Main use *
Bhutan	Chhukha	Chhukha	Ti Chu	1988	40		H
	Tala-Wankha	Phuntsholing	Wang (Raidak)	2006	91		H
	Kurichhu	Gyelposhing	Kuri	2002	33		H
	Basochu	Wangduephodrang	Baso stream	2001			H
	Punatsangchu		Puna Tsang	(under constr.)	141		H
India	Rihand	Sonbhadra	Rihand	1962	91	10 600	H
	Farakka barrage			1974			I
	Bhimgoda			1854			I
Nepal	Gandaki						I
	Kosi						I
Bangladesh	Manu barrage		Manu				I
	Tangon barrage		Tangon				I
	Teesta barrage		Teesta				I

\* I = irrigation; H = Hydropower

Figure 7 Large dams in GBM basin countries: not updated.

**Status of Hydro-meteorological Observation Network**

**Bangladesh:** A total of 46 synoptic stations are operated by the Bangladesh Meteorological Department (BMD). In addition, BMD operates 10 Pilot Balloon stations and 4 Rawinsonde stations. The Bangladesh Water Development Board (BWDB) maintains a well-distributed hydrological network countrywide (manual system) where there are 360 water level stations, 137 discharge measurement stations, 272 rainfall stations, 39 evaporation stations, 1928 morphological cross-sections and 1250 ground water measurement as shown in Figure 8.

<sup>13</sup> Adger et al. 2018. Ecosystem services, Well-being and Deltas: Current Knowledge and Understanding. In Nicholls et al. (Eds) Eco-system Services for Well-Being in Deltas. <https://doi.org/10.1007/978-3-319-71093-8>

<sup>15</sup> FAO 2011 <https://www.fao.org/3/CA2138EN/ca2138en.pdf>

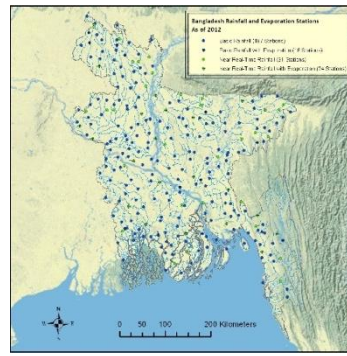
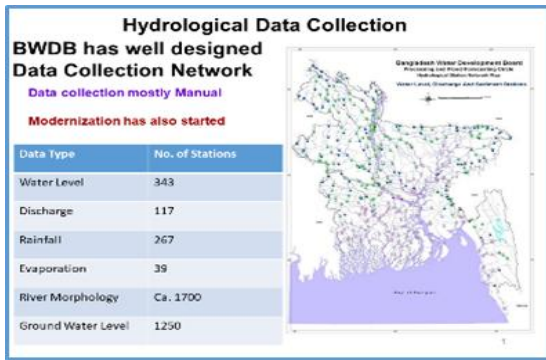


Figure 8: Available Hydrological and Meteorological stations or associated existing products in the GBM countries to be used for developing the HydroSOS system.

**Nepal:**

The DHM, Nepal is maintaining a network of 194 hydrological stations (48 manual only, 6 telemetric only and 140 manual and telemetric). Additionally, 11 cryosphere monitoring stations (2 fully automatic) and 22 sediment monitoring stations are being operated by the DHM. There are approximately 500 rainfall stations (182 manual only, 34 telemetric only and 284 manual and telemetric) as shown in Figure 9. The stations are continuously being upgraded to telemetric systems. Additionally, the department is operating 3 weather RADARs and one radiosonde station.

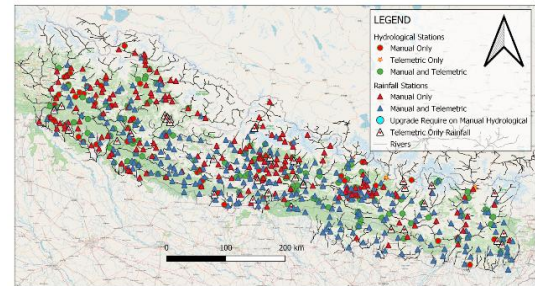


Figure 9: Location of hydro-meteorological stations of Nepal and its coverage

**Status of Flood Forecasting and Early Warning Solutions: Bangladesh**

The Flood Forecasting and Warning Center (FFWC), under the Bangladesh Water Development Board (BWDB), collects hydrological data from 109 water level stations and 74 rainfall stations to provide flood warnings. FFWC is involved in the preparation of flood status reports at national level, weekly bulletin during dry season, monthly and annual flood reports and issues a range of warning/advisories which include daily statistical bulletin of floods, river situation, descriptive flood bulletin, and forecasts for 24, 48, 72, 96 and 120 hours at 61 monitoring points on the major rivers. In addition, it provides a 10-day probabilistic flood forecast at 37 monitoring points on major rivers, and a special flood report during the monsoon season. During the pre-monsoon season, three-day flash flood forecasts are given at 25 monitoring points on the major rivers in the Northeastern region. FFWC is also connected with Flash Flood Guidance system (FFGS) and regularly receives updates about flash flood warnings.

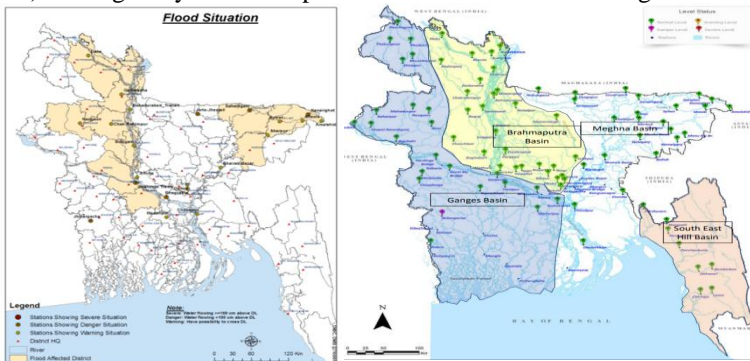


Figure 10: Flood monitoring situation in Bangladesh

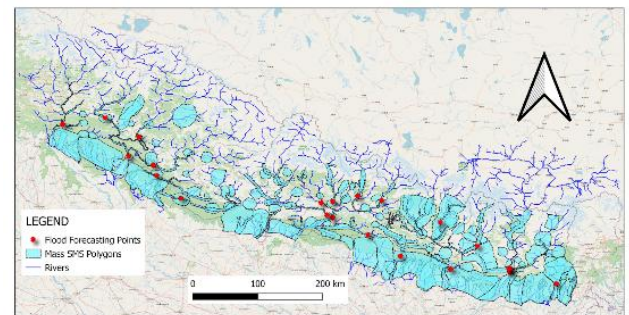


Figure 11: Existing Flood SMS Polygons and Major Flood Forecasting Points

**Nepal**

Based on Global, Regional and National level model outputs, Flash Flood Guidance System (FFGS), freely available products and technical capacity of DHM, the Flood Forecasting Division (FFD) of DHM issues the Flood Forecasting Bulletin daily during the Monsoon season, providing forecasts for the subsequent 3 days. District wise flash flood warnings with 24 hours lead period are also issued. Furthermore, Special Bulletins are issued throughout the year whenever there is a forecast of severe flooding in any specific region. The rainfall and water level data from telemetric stations, along with the products of RADAR and satellites are regularly monitored. Warning information on flood risk is communicated to the public in potential flood affected areas through SMS. For this purpose, 273 high flood risk zones have been identified and are being extended throughout the country. New projects have been planned such as the development of flood forecasts and rainstorm flow EWS. Some of the key challenges include greater coverage in the northern mountainous region, modeling capacity, impact-based forecasts and last mile connectivity.

**Climate Change Context**

**Past and present climate change**

The nature of change in climate over the GBM region points towards a widespread warming across the basin during the period 1980-2013<sup>16</sup>. Warming is found to be more intense over the northern part of the basin with a maximum decadal increase in temperature being 0.6 °C. During the same period, there is a significant decline in the rainfall over the basin. The monsoon rainfall which occurs mostly during the period June-August is estimated to have declined by as much as 39 mm per decade during 1998-2013 in the high precipitation regions such as the northeast of India, southwest of Bhutan, Nepal and Bangladesh. The rainfall appears to be increasing though insignificantly over the Ganga basin at the rate of 12 mm per decade. This change in the monsoon precipitation is not natural and is linked to anthropogenic causes. A strong correlation is found between declining monsoon rainfall and the increase in Green House Gas (GHG) emission. For example, in some of the region, confidence over attribution to GHG emission is more than 90%<sup>17</sup>.

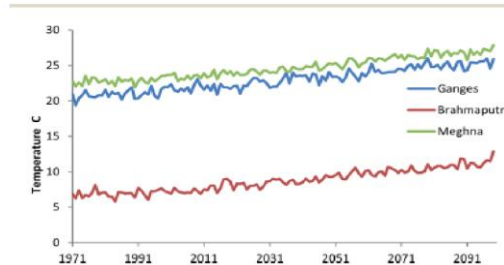


Figure: 12 Annual Mean Temp. Change over 1971-2099 in the GBM Catchment for Q0 realization (Source: Whitehead et al. 2015)

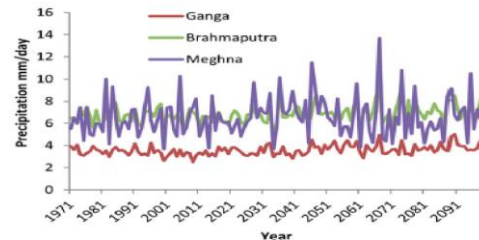


Figure: 13 Annual Mean Precipitation Change over 1971-2099 in GBM Catchment for Q0 Realization (Source: Whitehead et al., 2015)

Bangladesh is witnessing an average rise in temperature of 0.5 °C, over the period 1976 to 2019. The rise in maximum temp. is not uniform for example, compared to 0.5°C in the central region, the rise is higher up to 0.9 °C for the eastern region. The rainfall analysis for the same period shows that during the peak monsoon season (June to August), the average monthly mean rainfall has declined by 60 mm while in the period-Sep-Oct. it has increased by 43 mm. As a result of these changes, summers have become longer, winter warmer and the monsoon not only erratic but also extended from March to October<sup>18</sup>. The annual maximum temperature trend in Nepal is significantly positive (0.056oC/yr) and annual minimum temperature trend is also positive (0.002oC/yr) but it is insignificant. No significant trend has been observed for precipitation in any season. The number of rainy days is increasing significantly mainly in the northwestern districts of Nepal. Trends of warm days and warm nights are significantly increasing in the majority of the districts<sup>19</sup>. Further during the period 1977-2010, the Himalayan ice reserve of Nepal has declined by 29% or equivalent to 129 sq. km. The glaciers have receded on an average 38 km per year, and the number of glacial lakes has increased by 11%<sup>20</sup>. Other studies point out that the average temperature rose between 1-1.3 °C and the warming is neither uniform nor defined by the altitude.<sup>21</sup> There are positive and negative movements in so far as change in precipitation is concerned although overall there is minor change during 1971-2010. The areas receiving higher rainfall are becoming wetter while those receiving less rainfall are getting drier.<sup>22</sup>

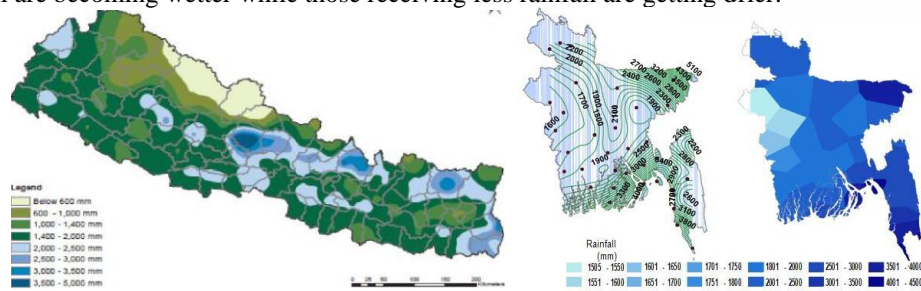


Figure 14 Mean annual precipitation in Bangladesh and Nepal

### Climate variations in two other GBM countries (non-targeted at this stage but linked with Bangladesh and Nepal)

Bhutan has experienced a temperature increase of just under 1°C during the twentieth century with a faster increase being reported in the last fifty years. Overall, the minimum temperature is increasing at a faster rate than the maximum. In terms of rainfall, there is a decline in the country's wettest region and a weakening of the summer monsoon over the subcontinent region<sup>23</sup>. Other studies also report marginal decrease in country's rainfall for the period 1996-2017.<sup>24</sup> The glacial area loss in Bhutan over the period 1980-2010 is 23.3% with a varying rate of reduction across different elevation zones. As a result, the number of glacial lakes has increased by 14.8%<sup>25</sup>. Since 1950's India has experienced a rise in average temperature, extreme temperature, rainfall events, droughts, sea level and a decline in monsoon precipitation with changes in the monsoon system. The average temperature of India over the period 1901-2018 has increased by 0.7 °C. Similarly, summer monsoon rainfall has decreased by 6% between 1951 and 2015. This decline is more pronounced in certain regions including the Indo Gangetic Plain. During the same period 1951-2015, the frequency and spatial coverage of droughts also increased. In some regions, such as the northeast, the frequency of droughts rose to two per decade, while the area affected expanded

<sup>16</sup> Khandu et al. 2017. Change and variability of precipitation and temperature in the GBM basin based on global high-resolution reanalysis. *Int. Journal of Climatology*, 37:2741-59.

<sup>17</sup> Sharma, C., Shukla, A.K. and Zhang, Y. 2021. Climate change detection and attribution in the Ganga-Brahmaputra-Meghna river basin. *Geoscience Frontiers*. <https://doi.org/10.1016/j.gsf.2021.101186>

<sup>18</sup> World Bank. 2021. Climate Change in Bangladesh. *Climate Change in Bangladesh: Impact on Infectious Diseases and Mental Health* (worldbank.org)

<sup>19</sup> DHM, 2017. Observed Climate Trend Analysis in the Districts and Physiographic Regions of Nepal (1971-2014). Department of Hydrology and Meteorology, Kathmandu

<sup>20</sup> Government of Nepal. 2016. Ministry of Population and Environment Report. *Nepal First NDC* pdf ([unfccc.int](http://unfccc.int))

<sup>21</sup> World Bank 2021. Climate Risk Country Profile Nepal. *Climate Risk Country Profile: Nepal* (adb.org)

<sup>22</sup> Bohlinger and Sorteberg. 2018. A comprehensive view on trends in extreme precipitation in Nepal. *Int. Journal of Climatology*, 38. DOI: 10.1002/joc.5299

<sup>23</sup> World Bank. 2021. Climate Risk Country Profile Bhutan. *Climate Risk Country Profile: Bhutan* ([reliefweb.int](https://reliefweb.int))

<sup>24</sup> NCHM. 2019. Report on the Historical Analysis on Climate and Climate Projection for Bhutan. Royal Government of Bhutan. *Analysis of Historical Climate and Climate Change Projection* pdf ([nchm.gov.bt](http://nchm.gov.bt))

<sup>25</sup> Bajracharya et al. 2014. The status and decadal glacial change in Bhutan from 1980s to 2010s based on satellite data. *Annals of Glaciology*, 55(66). doi: 10.3189/2014A066A125

by approximately 1.3 % per decade. In addition, the country faces sea level rise which was earlier at the rate of 1.06-1.75 mm per year during 1874-2004 but has increased to 3.3 mm per year during the period 1993-2017.<sup>26</sup>

### Past and Current Effects of Climate Change

The water level change in the GBM delta over a 45-year period, 1968-2012 is found to be faster ~ 3mm/y as compared to the global mean sea level ~2 mm/y. It is found to be accelerating since 2005 in the west of the delta and the maximum rate of delta subsidence during 1993-2012 was 1-7 mm/y.<sup>27</sup>

Bangladesh, under the combined impact of erratic monsoon, increased average temperature and other climatic stresses, is witnessing several kinds of effects. For example, the wetlands have dried up, the incidence of extreme weather events has increased and so has the frequency of tropical cyclones and intensity of floods. The tropical cyclone Mora, which struck in May 2017, affected approximately 3.3 million people, including Rohingya refugees hosted in the impacted region. Heavy rainfall events have also led to an increase in landslides, which were previously rare. There are regions which are increasingly becoming prone to droughts and an increase in dry months is found for the northwest region of the GBM basin area. Significant sea level rise is measured at different places; 4 mm per year at Hiron Point in the west, 6 mm per year at Char Changa, and 8 mm per year at Cox's Bazar in the southeast. Given that most of Bangladesh lies below 10 m above sea level (10% area is less than 1 m above sea level) an increasing sea level holds considerable threat for the future. The sea level rise has already led to doubling of the soil salinity and the affected region in the country has increased from 1.5 million ha in 1973 to 3 million ha in 2007.<sup>28</sup> One estimate is that the economic cost of climatic impact on key sectors such as agriculture, hydropower and water induced disasters is as much as 1.5 to 2 percentage of the country's GDP<sup>29</sup>

Nepal is experiencing several kinds of climatic change effects including drought, heat and cold waves, floods, landslide, GLOF, snow, avalanches, and forest fires. A trend analysis for drought over 32 years, 1981-2012 shows that there is an increase in severity and frequency particularly in the central region. Although no distinct trend has been observed in regional average precipitation, the interannual variability remains high. The summer seasons of 2004, 2005, 2006 and 2009 and winter seasons of 2006, 2008 and 2009, witnessed widespread and severe drought conditions impacting agriculture and livestock production.<sup>30</sup> Based on AQUEDUCT analysis, the population estimated to be affected annually by floods (as of 2010) was approximately 157,000, with a corresponding GDP impact of about 218 million USD. Monsoon floods, such as the one in 2009 (Koshi Embankment Breach) impacted 3.5 million in Nepal and India. There are over 1000 glacier lakes in Nepal, and accelerated glacier melting is leading to the formation of new lakes, increasing significantly the risk of GLOFs. Overall, during 1971 to 2004, more than 350,000 were exposed to extreme flood<sup>31</sup>. Migration in the form of seasonal or long term often is the principal adaptation measures which in turn have detrimental effects on communities<sup>32</sup>.

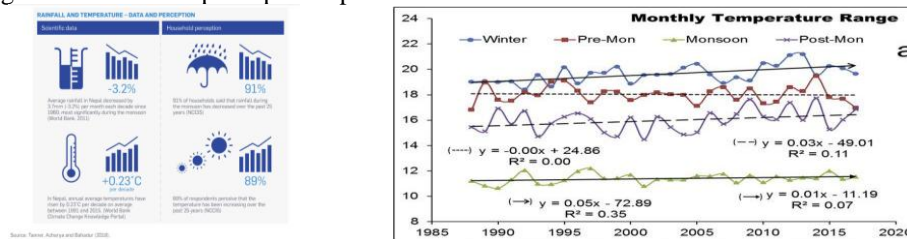


Figure 15: Bangladesh and Nepal climate change information

### Climate Change Effects in other GBM Countries:

Because of rising mean temperature and resulting acceleration in glacial melting; Bhutan faces effects of climatic change in several forms including formation of supra-glacial lake and lake outbursts, monsoon floods, drought, forest fire etc. The country's entire northern region has glacial, or snow fed lakes, and water levels in several of these lakes have reached critical geostatic thresholds. Following the Lemthang Tsho GLOF incident in 2015, a comprehensive assessment was carried out to identify potentially dangerous glacial lakes across the country<sup>33</sup>. Over the past decade, Buthan has experienced more frequent and intense flash floods, driven by increasing rainfall intensity and changes in the monsoon cycle. Closely associated with these floods are landslides, soil erosion, and the impacts of tropical cyclones. For example, cyclone Aila 2009 caused rainfall of 76 mm over 24 hours and triggered much devastation in Bhutan. An estimated 8.6 MT soil per hectare are lost annually especially in the rainy season. Similarly, in 2010, landslides and floods damaged more than 2000 acres of farmland and impacted over 4000 households. Given that the vast majority of the Bhutanese population depends on subsistence farming; erratic rainfall holds considerable risk leading to increasing drought incidence<sup>34</sup>.

Climatic changes are already being seen in a variety of forms in India. It includes increased occurrences of flood and droughts, decline in ground water availability, increased risk of coastal flooding, increased stress and undermining of water, health and energy security. In the Hindu Kush Himalaya (HKH) region, rising temperatures have resulted in a decline in snowfall and a retreat of glaciers in recent decades. Sea level rise in the North Indian Ocean (NIO) that was 1.06-1.75 mm per year during 1874-2004 has increased to 3.3. mm per year during 1993-2017. A decline in total monsoon rainfall during the last seven decades has increased the frequency and spatial extent of drought over the period 1951-2016. For example, areas such as northeast, southwest etc. of the country are experiencing 2 droughts per decade and further there is an increase in total area by 1.3% per decade. Although, there has been a significant reduction in the number of tropical cyclones in the North Indian Ocean (NIO) over the period 1951-2018, an increase in frequency (+1 per decade) has been observed for Very Severe Cyclonic Storm (VSCS) during the post monsoon cyclone season from 2000 to 2018<sup>35</sup>.

<sup>26</sup> MOES. 2020. Assessment of Climate Change over the Indian Region. Government of India. [499178\\_1\\_En\\_Print.indd \(reliefweb.int\)](#)

<sup>27</sup> Becker et al. 2020. Water level changes, Subsidence and Sea Level Rise in the Ganga-Brahmaputra-Meghna Delta. PNAS. 117(4):1867-76. [www.pnas.org/cgi/doi/10.1073/pnas.1912921117](#)

<sup>28</sup> Ministry of Foreign Affairs. 2018. Climate Change Profile Bangladesh. Govt. of Bangladesh. Bangladesh (1).pdf

<sup>29</sup> Government of Nepal. 2016. Ministry of Population and Environment Report. [Nepal First NDC.pdf \(unfccc.int\)](#)

<sup>30</sup> Dahal et al. 2016. Drought risk assessment in central Nepal: temporal and spatial analysis. [Drought risk assessment in central Nepal: temporal and spatial analysis \(springer.com\)](#)

<sup>31</sup> World Bank. 2021. Nepal Country Profile. [Climate Risk Country Profile: Nepal \(adb.org\)](#)

<sup>32</sup> Dixit, A. n.d. Impacts and Adaptive Strategies. [Climate Change in Nepal: Impacts and Adaptive Strategies | World Resources Institute \(wri.org\)](#)

<sup>33</sup> NCHM. 2019. Reassessment of potentially dangerous glacial lakes in Bhutan. Govt. of Bhutan. [Re-assessment of Potentially Dangerous Glacial Lakes.pdf \(nchm.gov.bt\)](#)

<sup>34</sup> ICIMOD. 2016. Climate+Change Handbook. BMCI, Bhutan. [icimodBhutanClimate016.pdf](#)

<sup>35</sup> Krishnan et al. 2020. Assessment of Climate Change over the Indian region. [499178\\_1\\_En\\_Print.indd \(ifd.ac.in\)](#)

## Future Climate Change in Bangladesh and Nepal (or GBM Basin in general)

### Future Effects of Climate Change

A study on climate impacts using alternate scenarios (business as usual, more sustainable and less sustainable future) shows that for 2050 and 2090 there will be significant enhancement of monsoon flow with a significant rise in flood potential (Fig: 16). Low flows are forecasted to result in an extended drought period with consequences for water and sediment supply, agricultural irrigation and saline water intrusion. One of the models which assessed likely effects of climate change on hydrology of GBM basin shows that by the end of 21st century the GBM basin will be warmer by  $\sim 3.4^{\circ}\text{C}$ , and changes of mean precipitation as runoff will increase by 16.3% in the Brahmaputra, 19.8% in the Ganga and 29.6% in the Meghna basin.<sup>36</sup> A simulation study based on a scenario of  $1.5$  to  $2^{\circ}\text{C}$  temperature increase over the GBM basin, shows a considerable rise in flood risk, in terms of area and water depth for two types; one in five and one in hundred year flood category.<sup>37</sup>

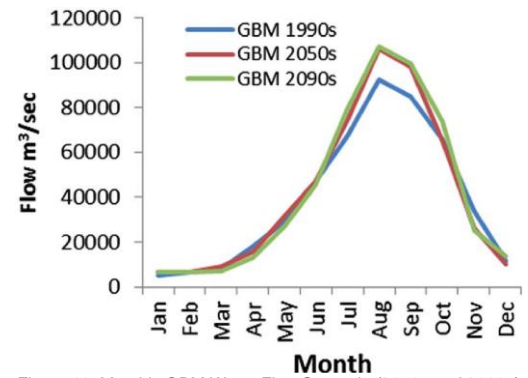


Figure 16: Monthly GBM Water Flow Scenario (2050s and 2090s)

Variations in temperature and rainfall are expected to have significant consequences for water availability and its quality in the GBM basin. It is estimated that by 2100 even under representative concentration pathway 4.5, the subsidence could double the projected sea level rise reaching 85-140 cm across the delta<sup>38</sup>. Despite the inherent uncertainties involved, the projections highlight the extent of the flood risk and coastal inundation which the delta population is exposed to in near future. The extent of saline intrusion in the GBM basin due to climatic change is being studied<sup>39</sup>. It shows an increasing salinity magnitude due to reduced upstream discharge and sea level rise (Akter et al. 2019). The sixth Intergovernmental Panel on Climate Change (IPCC) assessment report highlights the loss of snow cover in the Tibetan Plateau since the early 21st century and retreat of glaciers since 1970's. It is projected that the whole Tibetan Plateau and the Himalayan region will experience heavy precipitation in the 21st century. The South Asian region similarly will experience more intense and frequent heat waves and annual and summer monsoon will increase during the 21st century with enhanced inter-annual variation<sup>40</sup>.

Figures illustrate projected changes in average daily temperature, maximum and minimum for Bhutan under different pathways<sup>41</sup>. This study further shows an increase in annual median rainfall over all emission pathways by 2090. For example, precipitation is projected to increase by 10% under pathway RCP 6.0 and 11% under RCP 8.5 from a baseline median. The impacts of climate change will aggravate flood, drought and heat wave conditions and in addition will be felt in sectors such as water, forest and biodiversity, agriculture, energy. The climatic impact on flood alone is expected to increase over 41 million USD on GDP by 2030 in RCP 8.5 emission pathways and this will raise annual impact due to river flooding on Bhutan's GDP to 4%<sup>42</sup>. Increases in precipitation along the southern border with India during the monsoon season, coupled with a higher number of heavy-precipitation days, are likely to intensify flood risks, alter runoff patterns, and affect river discharge rates. The projected number of days for dry spells by the end of the century and impact of rising temperature on water resources, rate of snowmelt etc. are further challenges which require to be negotiated.

### Targeted Project Areas and Beneficiaries

In the GBM region, extreme weather hazards and climate change affect populations across multiple spatial, temporal and social scales. By mitigating the impact of flood and drought hazard, the project will benefit the overall population of the basin. In particular, the Early Warning System (EWS) will be designed to reach the civil protection services and other private and public stakeholders as well as the general public. The population segment in Bangladesh and Nepal will benefit directly from the project's outputs through the following types of activities: 1) new tools and products developed for risk reduction, such as flood and drought risk maps and climate scenarios. It will augment EWS, and climate change adaptation measures at the community level, 2) testing of the HydroSOS EWS on pilot areas to understand the applicability and effectiveness, 3) capacity building measures with an aim to updating or formulation of policies, plans and guidelines synergized with three components of the HydroSOS-BaNe project.

**Phase 1:** Under the GBM basin especially in Bangladesh and Nepal, flood hazards are mostly reported either as pluvial flood linked to high rainfall precipitation or as riverine flood. The flood risk maps for current and future predicted climates should therefore be developed for the overall surface of Bangladesh and Nepal to account for possible pluvial floods and risk indicators on population, built-up areas, agriculture, water resources, wetlands and protected areas etc. Drought on the other hand can affect any part of the basin. Through risk maps, climate scenarios and HydroSOS EWS, the program will provide important support for a larger population vulnerable to drought and its impact. The direct beneficiaries of the new tools within the two countries will include:

1. National Meteorological and Hydrological Services (approximately 500 persons from both countries), who will be contributing to the development of the tools, providing improved or new services but also gaining in capacities and means of actions.
2. Emergency, Civil protection authorities and Disaster Management Services (estimated 500 to 1000 persons from two countries), who will be integrating new risk maps/warning into their operating procedures and crisis management.

<sup>36</sup> Masood et al. 2015. Model study of the impacts of future climate change on hydrology of GBM Basin. *Hydrol. Earth System Science*, 19. doi:10.5194/hess-19-747-2015

<sup>37</sup> Uhe, P.F. et al. 2019. Enhanced Flood Risk with  $1.5^{\circ}\text{C}$  Global Warming in the Ganges, Brahmaputra, Meghna Basin. *Environ. Res. Lett.* 14: 074031. <https://doi.org/10.1088/1748-9326/ab10ee>

<sup>38</sup> Becker et al. 2020. Water level changes, Subsidence and Sea Level Rise in the Ganga-Brahmaputra-Meghna Delta. *PNAS*, 117(4):1867-76. [www.pnas.org/cgi/doi/10.1073/pnas.1912921117](http://www.pnas.org/cgi/doi/10.1073/pnas.1912921117)

<sup>39</sup> Akter, R., Asik, T.Z., Sakib, M. et al. 2019. The dominant climate change event for salinity intrusion in the GBM delta. *Climate*, 7, 69. <http://dx.doi.org/10.3390/cli7050069>

<sup>40</sup> IPCC Sixth Assessment Report, Working Group Physical Science Basis PowerPoint Presentation (ipcc.ch)

<sup>41</sup> World Bank and Asian Development Bank. 2021. Climate Risk Country Profile Bhutan. 15874-WB\_Bhutan Country Profile-WEB.pdf (worldbank.org)

<sup>42</sup> World Bank and Asian Development Bank. 2021. Climate Risk Country Profile Bhutan. 15874-WB\_Bhutan Country Profile-WEB.pdf (worldbank.org)

3. Other National authorities of the countries and related departments (estimated total 200 persons) such as Health, Water, Irrigation and Agriculture.
4. Social Institutions such as schools, hospitals, fire stations etc. (estimated to several thousands of people), who will be able to prepare or improve their emergency plans.
5. Non-governmental organizations (NGO's), International Non-governmental organizations (INGO's) (estimated to be several hundreds), who will either directly use the new information to improve their resilience capacity and adaptation or transfer to their partners.
6. Community-Based Organizations (CBO), farmer and fisher associations, in particular women's groups etc. (estimated to be thousands of persons over the basin) who will be using the new tools and methodologies to decrease their vulnerability to extreme events.
7. Managers of industrial sites (estimated to several thousands of people over the basin), and private companies (dam's operators) who will be able to draw emergency plans and build more resilient infrastructures.
8. Individual Community members of urban and rural areas especially youths who are more familiar with Information Technologies (potentially the whole population of Bangladesh and Nepal, but in the first stage, estimated 5-10 %, or approximately up to 1 million persons) who will, receive timely warning messages and possibly contribute to disseminating and crowdsourcing of information for early actions.

**Phase 2:** A series of pilot tests will be carried out to assess the applicability and effectiveness of the preparedness and response measures through simulation exercises, warning dissemination, and feedback collection of the HydroSOS flood and drought Early Warning System (a prototype of the HydroSOS products are provided under Annex 1) will be conducted during the monsoon and dry season for selected target areas as shown below in Table 4, which involve representatives of the major groups of beneficiaries including women, elderly, youths, children etc. as highlighted in the Gender Assessment report and Gender action plan presented under Annex 4. From this Ten pilot-test areas, vulnerable communities (at least 10-12 in each country) for the implementation of the community-based floods and drought management (CBFDM) activities (expected to be studied during year 1, 2 and 3 of the project) will be identified based on consultation and commitment from the Local Assembly or Municipality, Village Development committee, following the local planning process. This selection is also not finalized during the proposal development phase as it will avoid duplication of the support to the same community from other pipeline projects (from other donors if any) planned for the implementation. The following criteria will be considered to select communities for the implementation of the CBFDM activities.

- Communities with at least 500-1000 residents, (with a minimum 40 percent female population)
- Agricultural or urban areas with existing collaborations between communities and groups of citizens for example in the field of water resources management, land planning, risk reduction, exercises with civil security, any project related to the participation of citizens and communities. This approach aims to fill existing gaps and build on established capacities rather than duplicate previous efforts. Agricultural or urban areas that have been affected by extreme events (drought or flood).
- Possible areas where Early Warning Systems have been set up (by previous projects) and are being used.
- Areas preferably with mobile network coverage or with no telecommunication system.
- Areas where the effect of extreme events is known, or areas to be affected by dam operations.

Table 4: Pilot tests location for the flooding and dry season and also for the implementation of the community-based activities

Location of pilot sites (hazard type)	Estimation of the number of people participating to the pilot testing exercise	Criteria for selection
Kurigram, Bangladesh (Floods-Transboundary)	50,000	Kurigram district is one of the riverine flood prone areas. Over the last 25 years, a number of major flooding events have occurred, impacting over a million citizens. In 2020, Kurigram experienced the worst flooding event in the last 50 years. An estimated 50'000 people were affected. Significant damage was incurred on infrastructure, agriculture, livestock and housing. The population of the region is expected to reach 3 million by 2025 with women and elderly in particular exposed to hydro-meteorological hazards, and having less access to education, employment and services. The extent of flood prone areas in this region is very large due to its flat topography. In the flood prone area of Kurigram, development decisions are driven by individual economic capacity rather than by the level of risk awareness.
Lalmोनirhat, Bangladesh (Floods and Drought)	35,000	This district is fully dependent on the water from Teesta River for meeting its agricultural needs. Presence of the Gazoldoba barrage at the upstream and continuous extraction of water from the river leaves the downstream scarce in irrigation water. Lalmोनirhat is mainly affected by floods originating from the Teesta basin. Being a funnel shaped flashy basin, the Teesta plays a critical role in both flash and seasonal flooding. Most of the basin lies outside the country, and the presence of several water control structures are available and make it extremely difficult to forecast/manage flood events.

Faridpur, Bangladesh (Floods)	40,000	Faridpur is on the Padma basin, right after the confluence of Brahmaputra and Ganges. Flood in any one of the basins make the location vulnerable to flood.
Sunamganj, Bangladesh (Flash Floods)	25,000	Sunamganj is located in the North-Eastern region of the country, right below the Meghalaya in India. This critical position makes it highly vulnerable to both flash floods along with monsoon floods. The pre-monsoon flash floods is a big threat to rice crop. Infrastructure & livelihoods are also severely affected. In 2017, a devastating pre-monsoon flash flood nearly destroyed all the crops. In 2022, Sunamganj experienced the worst flooding in its recorded history.
Naogaon, Bangladesh (Floods and Drought)	35,000	Both floods and droughts are frequent in this region. This area receives huge flow from transboundary Himalayan tributaries during monsoon which recedes also relatively quickly. During the dry periods (Nov-May) due to high temperature and low rainfall, the area becomes susceptible to drought. Both floods and droughts impact agriculture, drinking water and the livelihoods of rural community.
West Rapti, Nepal (floods)	30000	The selected location, West Rapti has faced major flooding in the previous years, impacting several thousands of people. Geographically it has a plain topography. There are several active community-based organizations that could support the testing of the HydroSOS EWS. Also, this region has availability of reliable historical hydrological data which is important for calibrating the models.
Kankai (Jhapa) Flood and Drought Nepal	25000	The Kankai region (Jhapa) has vulnerable populations that have experienced both flash and riverine flooding. It has dense real-time observation network, which will be useful for developing the HydroSOS EWS and later for the verifying forecasts. Also, it will serve as a pilot site for testing drought events.
Bagmati River Nepal (Sarlahi, Rautahat) Flood and Drought	45,000	The Bagmati river in Nepal is selected for urban and riverine floods. Existing operational flood forecasting model are available and will be useful for comparison of the forecasts and warning of flooding events. Also, this is a water deficit basin during the low flow period.
Tinau River (Palpa, Rupendehi) Flood and Drought	50,000	Water deficit basin with smaller size to test the accuracy of the HydroSOS forecasts and warnings. Annual Flood events observed in the downstream area with impacts to urban population and infrastructures
Tamakoshi River (Dolakha) Transboundary and GLOF	17,000	This river in the Dolakha region is a transboundary river shared with China. This site is suitable for testing potential GLOF events. Also in this area, hydro- power projects are present which could provide valuable data for assessing the usefulness of HydroSOS products in the power generation and water management.

The pilot testing will provide the opportunity to train communities and agencies during real flooding or drought situations, helping to assess the effectiveness and applicability of the HydroSOS-BaNe EWS. The results of these exercises will provide lessons learned and will allow to identify gaps and challenges to improve the system and its services. The knowledge gained by the communities and agencies will be helpful to implement similar activities with other stakeholders. The pilot testing communities (100-150 at each site including women and youths) and agencies (10-20 at each site working in disaster management, civil protection, irrigation department, CBO's, NGO's) are expected to disseminate this knowledge and skills in other areas, inside or outside the basin, where floods and drought management are also of growing concern.

Figure 17: The targeted project region of Bangladesh and Nepal (area covered under the red boundary) with the potential pilot testing sites (sites are provided in table above) of the HydroSOS system and community-based initiatives are presented above. The test sites will be finalized during the inception phase of the project implementation.



Figure 17 Targeted Project Region and Pilot Testing Sites

**Phase 3:** Capacity development activities will be carried out for agencies at local/national and regional level and communities which are affected by floods and drought events during the different phases of the project, in the following areas:

- Extreme events, risks maps and climate change adaptation
  - Flood and Drought Risk assessment, and information on risk profile through a national/regional database;
  - Development of Floods and drought risk maps at national and transboundary level;
  - Information on future social and environmental risk scenarios and risk management strategies.
- Early Warning System for floods and droughts and risk reduction measures
  - End-to-End Early Warning System (E2E-EWS);
  - Dissemination of early warnings to agencies, INGOs, NGOs, communities and citizens;
  - Natural and nature-based solutions for floods considering ecosystem sustainability.
- Governance
  - Mainstreaming Gender in Flood Management.
  - Identification of gaps and needs for the long-term strategies for floods and drought management and climate change adaptation by local and national stakeholders in GBM countries.
  - Revision, or development, of plans, policies and guidelines for risk reduction in view of future climate change by national and regional policymakers.

### **Project / Programme Objectives**

The proposed project objective is to increase the climate adaptive capacities and resilience to hydro-climatic risks of the beneficiary communities in the Ganga Brahmaputra Meghna (GBM) River Basin in Bangladesh and Nepal. The project aims to strengthen community resilience by enhancing awareness and local ownership of climate change adaptation and risk reduction processes, while simultaneously diversifying and reinforcing the livelihoods of vulnerable households through the adoption of sustainable, climate-resilient livelihood strategies that secure income and promote long-term adaptive capacity to climate change events. For this, the project will develop local, national and regional adaptation strategies and implementation mechanisms based on the integrated monitoring and management of water resources for improved socio-economic and environmental development against the climate change and variability. Floods and drought being common feature in both countries, the project envisages strengthening the capacities of National Meteorological and Hydrological Services (NMHSs) through an innovative, robust and tailored regional Hydro-Meteorological early warning system (providing short term and seasonal status) embedded with a long-term integrated water resource information system and concrete adaptation actions developed through a participatory design and executed in an integrated manner.

The HydroSOS-BaNe project is aligned with the Adaptation Fund's strategic objective to "reduce vulnerability and increase adaptive capacity of communities to respond to the impacts of climate change at local, national and regional level" aligning with the AF's strategic outcomes of reduced exposure at national level to climate-related hazards and threats and Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level. The HydroSOS-BaNe project is directly linked to the Adaptation Fund's supported outcomes especially under Outcome 1, it reduces community exposure to climate-related water risks by providing timely hydrological monitoring and early warning information. In support of Outcome 3, promoting ecosystem resilience through improved water allocation and management practices that sustain ecosystem services. Through Outcome 6, HydroSOS-Bane project strengthens institutional frameworks by integrating hydrological information into national and regional planning and policy processes. Finally, under Outcome 7, the initiative fosters knowledge generation, sharing, and regional cooperation, ensuring that climate and water-related adaptation strategies are informed by science and applied across multiple scales.

The HydroSOS-BaNe project will support the United Nation Early Warning for All initiative (EW4All), which is led by the WMO and other international partners to cover everyone on the planet (Bangladesh and Nepal are part of first 30 priority countries) with the Early Warning system in the next five years. Also, the HydroSOS-BaNe project targeted countries are supported through Systematic Observation Financing Facility (SOFF) initiative (UN Fund co-created by UNDP, UNEP and WMO) The Adaptation Fund is a member of the SOFF Advisory Board. SOFF's goal is to support countries to improve their meteorological observations in compliance with the internationally agreed WMO Global Basic Observation Network (GBON), and which in turn will support Global Research Centers for Long-Range Forecasts (such as the European Centre for Medium-Range Weather Forecasts) in developing high quality meteorological and hydrological monitoring and forecasting products.

Existing or under-development national hydrological, meteorological, and climatological modeling systems, early warning and decision-making platforms will be incorporated into the proposed system with a scope to include lessons learned in each geographical context and incorporate important inputs from other projects and initiatives. This HydroSOS-BaNe project aims to enable different actors and stakeholders at the regional, national, and local levels to manage climate, weather, and water-related risks more effectively. This strategy recognizes that the current water crisis in the GBM basin is inextricably linked to climate change and requires systemic changes.

### **Theory of change**

While climate change adaptation Monitoring and Evaluation (M&E) places a heavy focus on identifying indicators for tracking and assessing adaptation, additional elements are needed to ensure an adequate M&E process.

Theories of change (ToC) lie at the heart of any robust M&E plan. They lay out desired and describe context-specific pathways to achieve these. ToCs articulate assumptions on how resources and actions lead to desired results and impacts, thus representing an important tool to detect possible maladaptation or equity concerns early in the intervention design process.

This project plans to drive that change using an integrated climate and water approach to deal with increasing exposure to water-related risks. A change of systems and mindset will be carried out by bringing together different disciplines in the water, climate, and disaster management sectors and fostering collaboration amongst global, national, and local partners which traditionally have been working separately. This will be done by breaking institutional barriers among sectors and organizations and establishing a model of cooperation that will enable different actors to achieve common goals. The broader aim is to forge new relationships that will deliver strategic results in the future, and beyond this project. A more detailed theory of change (ToC) framework is provided in Figure 18. National partners, including National Governments, Research Organizations, Private Sectors, etc. in each country will set their own roles and responsibilities around these focus areas, with decisions delegated as close to communities as possible. This will allow for maximum flexibility and impact depending on the available capacities in the country. Transitioning from a top-down approach to a collaborative, community-driven model will catalyze a significant transformation in the development and implementation of resilience strategies. Initially, decisions were made with minimal community input, resulting in misaligned priorities and a lack of local ownership. By actively involving communities in the decision-making process, incorporating their local knowledge, and ensuring continuous dialogue, the project seeks to empower communities, build trust, and enhance their sense of responsibility. Consequently, communities will not only support and sustain resilience initiatives more effectively but will also develop a stronger collective capacity to address future challenges. This transformation is expected to lead to better-coordinated efforts, increased awareness, and ultimately, more sustainable, and adaptive solutions that genuinely reflect the needs and aspirations of those most affected.

**Table 5: problems, stakeholders/beneficiaries to be involved, steps needed, measurable outputs, impacts related to ToC**

Some of the Key problems to address	Key stakeholders/beneficiaries	What steps are needed to bring about change?	What is the measurable effect (output)?	What is the long-term impact? Or benefits	Assumptions and risks
Lack of integrated flood and drought EWS available for warning services	National Meteorological and hydrological services, disaster management, agriculture, water resources management, irrigation, power agencies, population	Technical capacity development, support in co-design and development of the EWS, use of global observations and local in-situ data,	A transboundary, integrated EWS for floods and droughts with synergies and complementarities with existing projects, resources and infrastructures	Key stakeholders and populations are informed about any hydro-meteo hazards for preparedness and resilience	Support from the national agencies to provide historical and real-time data and information  Participation to decision-making and capacity development workshops
Lack of affordable, sustainable solutions for water resources management in consideration of declining water resources in urban and rural areas due to a combination of climate change and development impacts	National Meteorological and hydrological services, disaster management, agriculture, water resources management, irrigation	Development of Risk maps with impacts on various sectors and strengthened capacity of the stakeholders for risk-informed decision-making at local, national and regional levels	Risk maps with impacts on water resources management at different scales (status, short-term, long-term, sub-seasonal to seasonal, etc.)	Improvement in water resources management including support to sustainable hydropower generation, irrigation, agricultural activities	Data and information availability  Support from government to invests in development plans and programmes  Governmental restructuring of staffs will delay the implementation
Long-term climate change adaptation and management plans for the national and regional agencies	National Meteorological and hydrological services, disaster management, agriculture, water resources management, irrigation	Support and co-review or updating of the existing policies and plans on Climate change adaptation	Updated policies and plans on Climate change adaptation measures with recommendations for the future and including institutional arrangements	Policies and plans are linked with the national development plans and programs with sufficient budget or funding from the government	National policymakers' availability and support in the activities

The project result framework provided under section.III.F highlights the key outputs, baseline, indicators, target and means of verification which can support to measure the Theory of Change during the project implementation. This will be reviewed during yearly, mid-term and final evaluation of the project activities.

The ToC presented below under figure 18 (next page) will be refined and updated further by the regional and country teams during the inception phase of the project.

### **Project / Programme Components and Financing:**

Currently, the institutional arrangements for managing the water resources of the transboundary rivers of the Ganga Brahmaputra Meghna (GBM) basin are lacking or not enforced. This will change with effective synergy and coordination between the regional and national and other institutions linked to the basin. A separate approach by different countries leads to non-integrated management of water resources, increasing the risk of water scarcity, land and natural ecosystem degradation. Over the region of Bangladesh and Nepal, flood forecasting and early warning systems until now have been developed only for the sub-basins through the WMO, Global Environment Facility (GEF), World Bank supported projects. Further, it is not updated with the state-of-the-art technologies.

A large part of the whole basin therefore requires warning procedures to organize actions among the technical institutions in charge of assessing extreme hazards, the National Meteorological and Hydrological Services (NMHS), the institutions in charge of disaster civil security and the communities and citizens at risk. This implies that the technical capacities to develop and run the models, particularly for hydrological sub-seasonal to seasonal must also be developed, on the basis of the experience and existing capabilities in the two countries (learning from each other). Depending on the responsibilities and capacities of the Meteorological Service/Agency and the Hydrological Service in the two countries, the development and maintenance of the forecasting tools could be assigned at the regional level, mainly to regional entities such as ICIMOD (for regional coordination and cooperation) and RIMES (for technical development of tools and capacity development) ensuring long term investments and sustainability. Coordination and communication within agencies and communities on issues of floods and drought issues must be improved by developing the appropriate information services, radio programs, websites and mobile platforms. Furthermore, communities should trust and follow official messages issued by their national or regional centers. As the most effective way of communication occurs through mobile platforms, national institutions should explore the use of multiple technological and non-technological channels of communication.

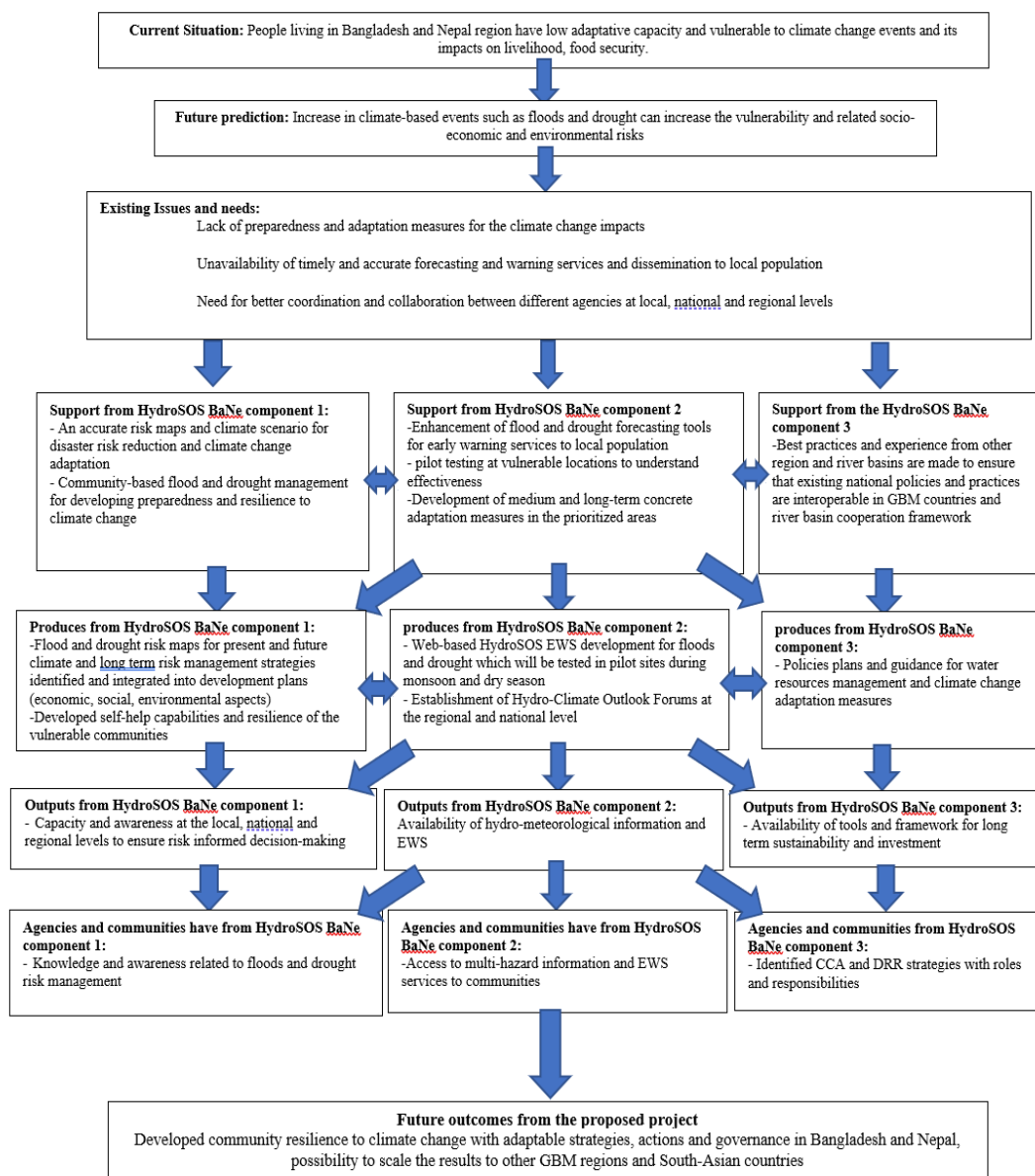


Figure 18: Theory of Change based on the HydroSOS-BaNe project

Several aspects must be defined and implemented in order to foster meaningful participation from communities and citizens in flood, drought, and environmental management. Besides legal Instruments and operational procedures to support integrated water resources management in the GBM Basin, additional non-structural measures, such as the development of risk culture, education, capacity building, and natural and nature-based solutions should be implemented with the involvement of the stakeholders to increase climate resilience of the population. The following concrete outcomes will be further refined or developed during the proposal phase, through additional national dialogues and based on-going, existing, or planned activities.

Table 6: HydroSOS-BaNe Project components, expected outputs and outcomes, and financing

Project Components	Expected Outcomes	Expected Concrete Outputs	Countries	Amount (USD)
Component 1: Risk-based preparedness and adaptation to climate variabilities, water use stresses and environmental uncertainties	Outcome 1.1 Floods and drought risks informed decision-making at the regional, national and local levels	Output 1.1.1 Vulnerability and exposure assessment (including gender and sector-wise analyses) and risk maps are developed for the targeted countries	Bangladesh and Nepal	3,000,000
		Output 1.1.2 Develop capacity and awareness at the local, national and regional levels to ensure risk informed decision-making		
		Output 1.1.3 Long term risk management strategies identified and integrated into development plans (economic, social, environmental aspects)		

	Outcome 1.2 Preparedness and resilience to climate change promoted through innovative and community-based initiatives.	Output 1.2.1 Implementation of community-based floods and drought management strategies in the vulnerable sites and different ecosystems		
		Output 1.2.2 Strengthened awareness of vulnerable communities and agencies on hydro-meteorological risks through education programs including nature-based solutions and mainstreaming gender		
Component 2: Strengthening water resources management through access to hydro-meteorological information and augment regional /national capacity to monitor and assess Hydro-Meteorological hazards	Outcome 2.1 A web-based Hydrological Status and Outlook System for EWS is designed and developed together with the National services	Output 2.1.1 Improved hydrological status and outlook instruments through data standardization for EWS is designed and developed	Bangladesh and Nepal	6,000,000
		Output 2.1.2 Existing products and tools are integrated and visualized in the regional HydroSOS for EWS		
		Output 2.1.3 Establishment of Hydro-Climate Outlook Forums at the regional level		
	Outcome 2.2 Development of medium and long-term concrete adaptation measures in the prioritized areas and updates based on lessons learned and monitoring instruments	Output 2.2.1 EWS and concrete adaptation measures tested in selected vulnerable communities.		
		Output 2.2.2 Coordination and collaboration developed at the regional, national and local level		
		Output 2.2.3 Decision-makers are informed with key water resources management parameters for current status and sub-seasonal and seasonal outlooks		
Component 3: Water and climate resilient regional cooperation arrangements together with National and regional stakeholders, and community involvement	Outcome 3.1 Improve information base and practices related to water resource management and climate change adaptation	Output 3.1.1 Best practices and experience from other region and river basins are made to ensure that existing national policies and practices are interoperable in GBM river basin cooperation framework	Bangladesh and Nepal	1,000,000
		Output 3.1.2 Analysis and optimisation of benefits of regional water and climate adaptation action.		
	Outcome 3.2 National adaptation strategies (i.e. NAPs) are fully inclusive of water management issues, address community concerns. Methodology and mechanism for leveraging and sharing benefits of optimizing adaptation at regional level are in place.	Output 3.2.1 An inclusive process is developed to ensure that National adaptation strategies explicitly address water relevant instruments and strategies. Inclusive approaches are operational to include local communities.		
		Output 3.2.2 Regional mechanism for adaptation cooperation on HydroSOS established and operational. Periodic review and update of the mechanism is agreed on by riparian states.		
Project/Programme Execution cost				1,000,000
Total Project/Programme Cost				11,000,000
Project/Programme Cycle Management Fee charged by the Implementing Entity				1,090,000
<b>Amount of Financing Requested</b>				<b>12,090,000</b>

### PROJECTED CALENDAR

**Table 7: HydroSOS-BaNe project key milestones and completion date (48 months)**

Milestones	Expected Dates
Start of Project/Programme Implementation	July 2026
Mid-term Review	July 2028
Project/Programme Closing	July 2030
Terminal Evaluation	January/February 2031

## PART II: PROJECT / PROGRAMME JUSTIFICATION

1. Describe the project components, particularly focusing on the concrete adaptation activities, how these activities would contribute to climate resilience, and how they would build added value through the regional approach, compared to implementing similar activities in each country individually.

There is a need for better, more effective, and coherent regional, national and local strategies and decision-making frameworks to address water related climate resilience challenges in the GBM riparian countries. These challenges are being exacerbated by a changing climate, deterioration of socio-economic and environmental conditions and unplanned development. It is therefore vital that the GBM basin is better understood through a regional project that provides opportunities to share experiences, and address knowledge gaps. Such a project will be useful to manage water resources; extreme events linked to climatic impact in a transboundary management framework and in an environment of mutual trust and confidence. The project partners propose to design and implement a large-scale, concrete and cooperative system allowing integration of relevant knowledge on quantitative and qualitative aspects of water resources and offer services and decision-making support to the end-users. This system (technical development, services delivery, and support activities) will be worked out in close cooperation with the national and local partners as well as with the community beneficiaries through stakeholder engagement practices. This will enhance livelihood support and contribute to increased adaptive capacity and resilience to climate change related events.

Until now, very little focus is found on determining the cost-effectiveness of climate change adaptation interventions across the GBM Basin as a whole. As a result, there is limited baseline information for comparative analyses of approaches that are sustainable and replicable across the entire GBM region. In the HydroSOS-BaNe project in Bangladesh and Nepal, new solutions will be implemented to improve risk reduction and climate change adaptation. Special attention will be given to promote community of users, guidance material, decision-support tools, online training, use of social networks and crowdsourcing. These solutions will be tailored according to the local needs and capacities, to account for social and cultural appropriateness. The HydroSOS E2E-EWS will be tested with additional climate projections to study the impact of future scenarios on spatial and urban planning and their consequences on socio-economic development.

**The basin scale approach involving two countries is a suitable way to identify and implement cost-effective measures as countries in GBM region have similar challenges related to climate change events (floods and droughts) that will be addressed through this project. Unfortunately, India being an upstream country has presently not provided their agreement and endorsement to join the HydroSOS project in the GBM countries. However, they will technically observe the implementation of the project activities and in future will design a HydroSOS standalone national project implementing from methodology and tools tested under this proposed HydroSOS-BaNe project.** The proposed project's activities under each component will promote improved coordination among regional, national and local institutions responsible for transboundary water management, disaster risk reduction and climate change adaptation. Through integration of previous knowledge and ongoing projects of the two participating countries, the planned project will ensure a) minimum overlap and b) transfer of methodologies and skills from one area to the other. A regional approach results in greater co-benefits as compared to the national one because one set of resources generates productive outcomes for two countries, which individual national projects would have achieved using more resources (human, time as well as material resources). Working at a regional level will allow the proposed project to reach several types of communities (rural, urban, semi-urban, transboundary, etc.) of the two countries with new methodologies and tools. The development and maintenance of E2E-EWS at the regional level and all related functionalities can be mutualized and shared depending on the individual needs and uses. The transboundary EWS dissemination strategies will determine the most efficient and effective ways to reach the remotest areas or the last-mile and will have broader coverage, so as to facilitate early warnings to the most vulnerable populations. The developed methodologies can be tested later on a larger scale within the basin or easily adapted to similar types of environments at local or national level. It will thus create a community of users and will also foster integration of socio-economic and environmental risks and climate change approaches at national, regional and local levels.

A regional approach involving Bangladesh and Nepal will enable the two countries to work in a more coordinated manner and additionally, transboundary cooperation and joint actions will allow them to share data and information on weather, climate and water resources and avoid disaster impacts on environment, social and economic services. Such regional approach will enhance cost effectiveness of capacity development (at one time participants from two countries will be involved) as well as ensuring a certain level of generic scope of tools and methodologies developed for future application beyond the pilot testing sites. Centralizing the capacity building of the Hydro-Meteorological Agencies together with the regional body will enhance cost effectiveness. The regional approach will be realized through the HydroSOS-BaNe project activities such as capacity development, development of products, tools and systems, sharing of experiences, updating the policies, plans and guidelines etc. in the two countries and will support:

### 1. Regional Data Integration and Sharing (through Component 1 and 2 related activities)

- **HydroSOS-BaNe** project facilitates the **real-time sharing of hydrological data and forecasts** across Nepal and Bangladesh, particularly for transboundary river basins like the Ganges and Brahmaputra. This enables **early, coordinated action** upstream and downstream — for example, if flooding is expected in Nepal and India (monitoring through freely available remote sensing/satellite-based products), downstream communities in Bangladesh can receive advance warnings.
- Standardizing data formats and protocols helps ensure **interoperability between national systems and interconnected with the regional or global level products and systems for better risk informed decision making.**

### 2. Development of Harmonized Early Warning Products (through Component 1 and 2 related activities)

- The project supports the **co-development of regional flood and drought outlooks** using both meteorological forecasts and hydrological modeling. Forecasters and other stakeholders from both countries will share knowledge and skills in monitoring and forecasting of floods and drought events

### 3. Strengthening Institutional Collaboration (through Component 1, 2 and 3 related activities)

- HydroSOS-BaNe encourages **cross-border institutional coordination** between hydrological and disaster management authorities, such as: Nepal's Department of Hydrology and Meteorology (DHM) and Bangladesh Water Development Board (BWDB) and Flood Forecasting and Warning Centre (FFWC) particularly by strengthening the existing Memorandum of Undertaking (MoU) on the Joint River Commission formed between the two countries. The institutional collaboration will bring **Greater trust and cooperation** between national agencies through shared tools and communication channels.

#### 4. Support for Policy and Regional DRR Frameworks (through Component 1 and 3 related activities)

- The project aligns with and informs **regional frameworks** such as the **South Asian Association for Regional Cooperation (SAARC) Disaster Management Centre** strategies.
- HydroSOS-BaNe project can provide evidence and tools to support **regional agreements on transboundary flood and drought risk management**, contributing to climate diplomacy and resilience building.

#### 5. Long-Term Hydrological Outlooks for Development Planning and Services to communities (through Component 1 and 2 related activities)

- The system provides **seasonal and sub-seasonal hydrological outlooks**, which are critical for managing drought risks, dams and reservoir operations, irrigation management and agricultural planning.
- These outlooks allow governments in both Nepal and Bangladesh to plan **cross-border water use, irrigation schedules, and preparedness interventions** collaboratively.

#### **Component 1: Risk-based preparedness and adaptation to the climate variabilities and water and environmental uncertainties**

The GBM region is one of the poorest in the world and carries large dependence on water resources as most are engaged in occupations such as farming, forestry, livestock, fishing. Freshwater sources, which were once abundant, are increasingly under stress due to the twin impacts of climate change and population growth. In view of the necessity to safeguard livelihoods from the increasing effects of climate change, it is essential to have an effective water resource management mechanism that provides protection from floods and droughts. The first component seeks to build resilience through carrying out flood and drought risk analysis integrating basin scale to the local level. Risk-based preparedness and adaptation to climate variabilities, water use stresses, and environmental uncertainties will allow us to identify how the basin ecosystems are continually being threatened by multiple drivers of the change mainly due to human activities for example, use of environmental pollutants, increase in pollution from industries, agriculture, households etc. Risk maps for floods and drought for the current climate and future projected climate will be developed for various risk indicators (impact on population, built-up areas, agricultural crops, water resources, protected and wetland areas etc.). It will combine transboundary water resource management strategies with innovative climate adaptive measures, disaster preparedness and capacity building programs for the target communities. Some of the key risk mapping activities include comprehensive vulnerability/exposure analysis to ensure representation of differential risk posed on account of gender, age, ethnicity, ecosystem, livelihood choices etc. Risk maps developed will be integrated into the decision-making process through systematic training and awareness programs from the local to national and regional level. Insights from the analysis will be used to build climate resilience by mainstreaming Disaster Risk Reduction (DRR) into the development process such as effecting necessary changes in policies and programs. CBFDM activities in the flood and drought-prone areas will develop self-help capabilities and resilience through Climate Change Adaptation and Disaster Risk Reduction measures. Following this risk management strategies for social, economic and environmental protection and growth are identified for long-term sustainability. A key focus of the component will be incorporation of the role of gender and nature-based solutions in alleviating risk and ensuring smooth adaptation.

#### **Outcome 1.1 Floods and drought risks informed decision-making at the regional, national and local levels**

Outputs under the Outcome 1.1 aim to identify and assess the current, and future vulnerabilities, capacities, exposures and risks. Flood and drought risk maps will be developed at local, national and regional level. Climate scenarios will be compiled and disseminated to the stakeholders, together with the risk maps, to study the possible impact of climate change on the current vulnerabilities and risks during capacity building sessions. This will provide opportunities to draw recommendations for integrating climate change adaptation approaches into the current disaster risk strategies at the national and regional levels.

##### Output 1.1.1 Vulnerability and exposure assessment (including gender and sector-wise analyses) and risk maps are developed for the GBM basin

Activity 1.1.1.1 Conduct a desk study (compilation of existing evidence-based past data (topographic maps, satellite images, studies of extreme events, reports of disasters, etc.) available at the national and regional levels) and field visits to 10 selected pilot locations to gather available information on vulnerability and exposure for current and future climate and identify gaps or additional needs.

Activity 1.1.1.2 Develop an action plan (one regional and two national levels) to complement gathered information on the exposure and vulnerabilities

Activity 1.1.1.3 Organize stakeholder consultations (two national meetings and one regional workshop), working on risk management to select priority areas for community consultations.

Activity 1.1.1.4 Conduct pilot field studies (focus group discussion and semi-structured interviews) with 30 communities to identify the multi-dimensional drivers of vulnerability and risk (social, economic, ecological, cultural, political, and infrastructural determinants of vulnerability) in Bangladesh and Nepal region highly exposed to different hydrometeorological hazards

Activity 1.1.1.5 Draft field studies reports (two national level) and the GBM-atlas with the existing static information available

Output 1.1.2 Develop capacity and awareness at the local, national and regional levels to ensure risk informed decision-making

Activity 1.1.2.1 Assess the available IT equipment (computers, servers, databases, etc.) and IT/GIS expertise at the NMHSs services and other relevant services (e.g. Geographical Institute, Disaster Management, etc.) and regional level. Purchase additional equipment if necessary

Activity 1.1.2.2 Create the HydroSOS information exchange IT network by connecting the existing information and data available at the national and regional services

Activity 1.1.2.3 Develop meteorological, climatological and hydrological database at the national levels and create the links with the existing databases for the collected information on hazards, vulnerabilities and exposure including the main driving hydro-meteorological parameters for floods and drought events (e.g. precipitation, evaporation, water levels, temperature, soil moisture, soil type, etc.)

Activity 1.1.2.4 Develop web-based flood and drought risk maps for both Bangladesh and Nepal using the dynamic hydro-meteorological, environmental and static social and structural database and existing maps developed in the GBM targeted countries through the past projects (see part II.G for more information). The maps will be developed by over 20 internal experts and 4 national training workshops.

Activity 1.1.2.5 Scenarios for socio-economic and environment development along with the climate change projections are collected and projected impacts on population, water resources, urban development, environment and agricultural areas are analyzed for both Bangladesh and Nepal

Activity 1.1.2.6 Organize two national training workshops for professionals related to hydrology and meteorology, disaster management, and GIS etc. to convey knowledge and improve skills needed for using risk maps

Activity 1.1.2.7 Identify and assign roles and responsibilities to the agencies and organizations forming a task team (each with 10 members) at national levels to regularly complement and improve the database and risk maps and also to monitor and report on the new updates

Output 1.1.3 Long term risk management strategies identified and integrated into development plans (economic, social, environmental aspects)

Activity 1.1.3.1 Design and develop regional/national guideline presenting the entire process of risk maps development and future impacts on various sectors with examples of implementation on highly vulnerable urbans and agricultural areas

Activity 1.1.3.2 Develop supplementary means of communication to reach a wider population (more than 10 infographics, posters, videos, leaflets for schools, etc. are developed and shared in various social media channels and hard copy distribution in the public events)

Activity 1.1.3.3 Organize 20 local trainings and workshops with stakeholders (representatives of communities, local policymakers, and decision makers) to disseminate the information on future climate and risk changes and to obtain additional qualitative input on potential impacts for socio-economic and environmental aspects

Activity 1.1.3.4 Develop safeguard action plan for risk management at medium and long term with the output from workshops and consultations with the relevant stakeholders (more than 1,000 people are consulted during the workshops or interviews in the field)

## **Outcome 1.2 Preparedness and resilience to climate change promoted through innovative and community-based initiatives.**

Under Outcome 1.2, the development of new tools to reduce the impact of extreme events, capacity building activities allow to spread knowledge on disaster risk reduction prevention to a larger number of communities and to focus on the most vulnerable groups. To foster enhanced participation of local population, community-based floods and drought management activities will be implemented in combination of structural and non-structural methods, including natural and nature-based flood solutions, to maximize the benefits of floodplains. The Training manual for mainstreaming gender in Integrated Flood Management from WMO will strengthen the women, youth, and elderly and other vulnerable groups active participation to the flood management. These methodologies highlight special aspects of risk prevention with practical guidance to give attention on rural and urban development, areas of global importance for ecosystems protection and women participation.

Output 1.2.1 Implementation of community-based flood and drought management strategies in the 20 vulnerable sites and in different ecosystems

Activity 1.2.1.1 Conduct two participatory community consultations in each of 20 vulnerable sites to identify and select the appropriate local measures or equipment (non-structural preparedness tools such as early warning dissemination through loudspeakers and local radio, locally installed rain-gauges and river-gauges for hydrological data collection, marking of vulnerable houses for rapid response support, flood level marking plates to mark the previous year's floods useful for future construction of resilient houses, simulation exercises, knowledge and awareness session on disaster risk reduction, ecosystem services, climate change adaptation and drought indicators).

Activity 1.2.1.2 Develop and install the local preparedness measures (at least 5 per vulnerable site or communities) as identified with the communities under activity 1.2.1.1

Activity 1.2.1.3 Identification of existing or development of new local flood and drought management committees or groups (at least one in each site)

Activity 1.2.1.4. Capacity building workshops (2 in each site) of local management committees or groups identified under activity 1.2.1.3

Activity 1.2.1.5 Development of community-based flood and drought management manual (one for each country or one at the regional level) including safety and safeguard measures for preservation of natural habitats, land and soil conservation, biological diversity.

Activity 1.2.1.6 Organize 20 local meetings to share knowledge and experience of added value of local measures or equipment under 1.2.1.2

**Output 1.2.2** Strengthened awareness of vulnerable communities and agencies on hydro-meteorological risks through education programs including nature-based solutions and mainstreaming gender

Activity 1.2.2.1 Organize dedicated short courses (one for each country with 50 plus participants) on the IUCN standards for nature-based solutions approaches and concepts for targeted beneficiaries to disseminate knowledge on natural and nature-based solutions (NbS) for flood and drought management

Activity 1.2.2.2 Collect feedback from the workshop participants on their views and perceptions of NbS tools

Activity 1.2.2.3 Recommend actions (one report for each national levels and one for regional level) to increase the use of natural and nature-based solutions and environmentally friendly methodologies with the involvement of local population and aligning with the Adaptation Fund ESP principles

Activity 1.2.2.4 Conduct workshops (2 in each country) to provide support for developing project proposals (submission to the internal and external agencies in future) on implementing natural and nature-based solutions for the flood and drought events.

Activity 1.2.2.5 Organize and conduct national and local workshops (5 in each country with over 50 participants, at least 50% of whom are women) on the Training Manual for mainstreaming gender in the End-to-End Early Warning System for Flood Forecasting (E2E-EWS-FF) and flood management with potential participants from NMHSs, local policymakers, civil authorities, women and community-based organizations etc.

Activity 1.2.2.6 Collect feedback from the workshop participants on their views and knowledge sharing on mainstreaming gender in E2E-EWS-FF and IFM with other stakeholders

Activity 1.2.2.7 Recommend actions (one regional level report) that would improve the participation of women and other vulnerable groups into flood management and early warning

## **Component 2: Strengthening water resources management through access to hydro-meteorological information and augment regional /national capacity to monitor and assess hydro-meteorological hazards**

The primary focus of the second component will be development of a) web based EWS in association with national hydro-meteorological agencies from a regional scale hydrological status/outlook platform and b) formulation and testing of concrete adaptation measures for the medium and long term. A range of activities such as data standardization, data sharing mechanism, integration of existing tools and available methods will be undertaken to develop an EWS to operate at a regional level. Based on lessons learned, concrete adaptation measures will be formulated and tested in selected vulnerable communities. The measures such as risk-based maps and their effective use to be accomplished through institutionalization of the regional cooperation framework and continuous system monitoring to enable remedial measures to be taken. While the HydroSOS-BaNe project does not directly target the hydro power or agriculture sector, although significant economic benefits are expected to contribute to enhanced hydropower generation, agriculture and irrigation sector day to day activities.

1. **Improved Water Availability Forecasting for Hydropower:** The project strengthens hydrological monitoring, seasonal outlooks, and early warning systems, which are crucial for hydropower planning and operations. Real-time and forecasted data on streamflow, drought risk, and catchment conditions will: Help optimize reservoir operations. Enhance water release scheduling. Triggers for over-holding of water leading to dam break etc. This directly supports efficient and climate-resilient energy production, especially in Nepal where hydropower accounts for over 96% of electricity generation.
2. **Risk Reduction for Infrastructure and Investment:** HydroSOS enhances the region's capacity to anticipate and respond to floods, landslides, and GLOFs, which often damage hydropower facilities. It will provide early warnings that allow proactive infrastructure protection and risk-informed maintenance. This results in lower operational disruptions, fewer repair costs, and increased return on investment for hydropower developers.
3. **Data-Driven Climate Adaptation for Energy Security:** The risk maps and climate scenarios, drought/flood scenarios, and seasonal climate outlooks developed under HydroSOS EWS will enable the energy sector to incorporate climate risk into long-term planning and support future siting, design, and resilience upgrades of power infrastructure in transboundary river basins.
4. **Co-benefits for Regional Development and Power Trade:** By improving transboundary water governance and forecasting, the project reduces uncertainty in water availability across borders, and it creates a stable foundation for regional hydropower cooperation and energy trade, particularly between Nepal, India, and Bangladesh.

### **Outcome 2.1 A web-based Hydrological Status and Outlook System for EWS is designed and developed together with the National services**

Under Outcome 2.1, one of the central outputs is the development of an End-to-End Early Warning System covering the various areas at risk of floods and droughts. The system will enable the production and dissemination of warnings according to predefined risks levels, using colour coding and icons for the different types of hazards, similarly to the warning systems largely installed over a large number of countries and transboundary watersheds

- Output 2.1.1 Improved hydrological status and outlook instruments through data standardization for EWS is designed and developed
- Activity 2.1.1.1 Make an inventory of the gauging stations (20 consultation meetings with hydro-met representatives at the local levels in each country) with real-time data transfer (or pseudo real-time) in the GBM Basin and prepare descriptive sheets for each station (location, equipment, data series, etc.)
  - Activity 2.1.1.2 Perform a field visit to 40 locations and desk studies to check the availability and quality of the data and information related to runoff, rainfall and other relevant hydrometeorological and agrometeorological data and also through the flood forecasting and drought monitoring products available at each NMHSs and other relevant institutions
  - Activity 2.1.1.3 Update the database of hydro-meteorological parameters with new information, or interconnect with existing platforms mainly through WMO Hydrohub (enhancing hydrological monitoring and data exchange) and World Hydrological Observing System (WHOS) mandate of standardization of data and information management systems.
  - Activity 2.1.1.4 Organize 3 training workshops (one each at national levels and one at the regional level) for the NMHSs staff related to data collection, calibration and maintenance of equipment following WMO standards
  - Activity 2.1.1.5 Define threshold descriptors for flood and drought events based on hydro-meteorological events and risk maps for various risk levels (for example, low- medium-high) through 10 consultation meetings with technical services and local representatives supported by evidence-based experiences.
  - Activity 2.1.1.6 Establish the threshold values for floods and droughts at and around each gauging station, based on correlations with past events.
  - Activity 2.1.1.7 Conduct the water resources assessment in the GBM region (at 10 pilot areas in the two countries highlighted under Table 4) to understand the changing value of water level, water quality, water flows (also at locations such as hydropower dams, reservoirs), in relationship to current status and past events and for developing services for hydro-power generation, agriculture, irrigation, water utility etc.
  - Activity 2.1.1.8 Develop the HydroSOS products for the GBM basin (technical support to develop monthly status and outlook products and 20 training workshops at the national level) based on above defined thresholds and real time and historical information available at the National level and from Satellite based products.
  - Activity 2.1.1.9 Link the thresholds of flood and drought (weekly, monthly, quarterly and half yearly scale) with the socio-economic and environmental impact at the national level and provide advisory services to various private sector entities and agencies (involved in hydro-power generation, agriculture, irrigation, water utility) improving their economical activities.
- Output 2.1.2 Existing products and tools are integrated and visualized in the regional HydroSOS for EWS
- Activity 2.1.2.1 For the areas with available forecast models in the sub-basins (e.g., Ganga, Brahmaputra and Meghna basin), develop procedures to integrate the outputs of the existing products and models within the network of centers producing HydroSOS in collaboration with the NMHSs
  - Activity 2.1.2.2 Develop software to collect the meteorological and hydrological forecasts (more than 3 to 4 forecasts are integrated) and to calculate the daily warning status or outlook levels for each of the sub-basin and vulnerable areas
  - Activity 2.1.2.3 Design and develop the web interface to gather and visualize all individual warning levels on the main HydroSOS transboundary system
  - Activity 2.1.2.4 Prepare user guides (at national level and in local languages) to convey all available knowledge on the interface to the various groups of users (forecasters, IT staff, decision-makers, etc.) and develop sector specific DSS content to be disseminated to various stakeholders
  - Activity 2.1.2.5 Conduct 3 national and regional training workshops with NMHS professionals, local/national agencies and users of the web based EWS and water resources management for using Hydro SOS.
  - Activity 2.1.2.6 Gather feedback, suggestions and scope for improvement from the workshop participants
  - Activity 2.1.2.7. In Bangladesh and Nepal, update integrated water resources management strategies based on the advisories provided to various agencies on sub-seasonal and seasonal related outlooks for hydrological services
  - Activity 2.1.2.8. Organize 2 regional workshops (with more than 30 participants out of which 40% are female) to share experiences on risk maps and hydro-SOS EWS with other GBM countries
- Output 2.1.3 Establishment of Hydro-Climate Outlook Forums at the regional level
- Activity 2.1.3.1 Identify linkages with the existing regional Climate Outlook forum disseminating the information available with the HydroSOS BaNe system
  - Activity 2.1.3.2 Nominate at least 10 members for the Hydrological outlook group which could be merged with the climate outlook forum at the regional level
  - Activity 2.1.3.3 Organize 4 annual regional Hydro-climate outlook meetings in each country with the existing and nominated members
  - Activity 2.1.3.4 Develop national and regional guidance documents for regular coordination and meetings with the Hydro-climate outlook members

## **Outcome 2.2 Development of medium and long-term concrete adaptation measures in the prioritized areas and updates based on lessons learned and monitoring instruments**

Under the outcome 2.2, A series of pilot tests will ensure that HydroSOS EWS is a robust platform, that warnings messages are delivered on time and understood by the users. These real-condition tests will also provide the opportunity to clarify the responsibilities, roles and collaborations among actors and stakeholders involved in Floods and Drought management activities. Training and awareness sessions

at the local level will ensure that warnings are delivered in a suitable way to the population, especially to the most vulnerable groups including women, and that proper actions are undertaken when extreme events are forecasted.

Output 2.2.1 EWS and testing of identified adaptation measures in selected vulnerable communities.

Activity 2.2.1.1 Discuss the selection of the 10 pilot test areas with the concerned agencies and communities (10 meetings) based on the list presented in Table 4, to confirm whether they remain applicable for the testing of the HydroSOS EWS during monsoon and dry season.

Activity 2.2.1.2 Organize meetings on each of the pilot sub-areas (30 locations in total) to identify the roles and responsibilities of the different stakeholder groups during the tests and present the coordination and collaboration mechanism enabling first responders to efficiently receive and use the HydroSOS early warning information

Activity 2.2.1.3 Identify good practices, challenges and limitations of products and services during the Flood and Drought events at each of the 10 pilot testing locations (conduct 2 meetings at each site)

Activity 2.2.1.4 Raise awareness about the pilot testing using multimedia channels (develop one video for each country)

Activity 2.2.1.5 Develop the national level action plan (2 in total) to further improve products and services after the pilot testing

Output 2.2.2 Coordination and collaboration developed at the regional, national and local level

Activity 2.2.2.1 Organize 4 national consultative workshops (with participants from local/national agencies involved in Flood and Drought management) to share the knowledge (new methodologies, concepts and tools for effective forecasting and dissemination of early warnings) from the pilot tests

Activity 2.2.2.2 Based on pilot testing, update/develop coordination and collaboration guidelines (one for each country) linking with the standard operating procedures (SOPs) for jointly preparing and responding to future flood and drought events

Output 2.2.3 Decision-makers are informed with key water resources management parameters for current status and sub-seasonal and seasonal outlooks

Activity 2.2.3.1 Describe the network of the relevant policymakers (at least 10 from each country) responsible for floods and drought management as well as other related fields (water resources, health, agriculture, ecosystem, forestry, soil, and land management) through national consultation meetings.

Activity 2.2.3.2 Organize and conduct 4 national workshops in total to identify the gaps and needs in existing policies and plans with special attention to safeguard actions that minimize direct and indirect risks arising from the project activities, and to highlight the key long-term strategies for water resources management especially for flood current status and sub-seasonal to seasonal drought outlooks.

Activity 2.2.3.3 Present the recommendations to the concerned decision-makers at the national level through a national workshop in each country

### **Component 3: Water and climate resilient regional cooperation arrangements together with National and regional stakeholders, and community involvement**

Presently, the GBM countries as well as at the region lacks transboundary level decision framework and strategies to overcome the challenges of the basin-wide water resources management. To increase adaptive capacity and empower people to cope with their changing environment, the development of decision-support framework can help national and local agencies to mutually understand and respond to challenges and opportunities in the GBM countries.

The project builds on a number of CCA and DRR related national and regional policies and plans, guidelines and acts listed under the section II.E and F. However, a large coordination effort at the national and regional levels, joint methodologies for refining or updating the plans and policies and shared tools are still needed to ensure that the results and outputs of the national projects are integrated at the regional level as the river basins are shared between the GBM countries. The HydroSOS BaNe project promotes water and climate-resilient regional cooperation by fostering inclusive policies and plans that bring together national and regional stakeholders alongside active community participation. Through collaborative frameworks, the project strengthens institutional linkages, aligns national strategies with regional priorities, and ensures that local voices are integrated into decision-making processes. This approach not only enhances coordinated responses to climate and water challenges but also builds shared ownership, accountability, and sustainability of adaptation measures across scales. Activities of component 3 explore how coordination efforts at the regional level will be beneficial to the concerned institutions, such as the NMHSs, Disaster Management, Environmental Agencies to plan, test and improve strategies based on experience sharing. Adaptation measures and strategies aligning with AF ESP and gender principles will be discussed at the local level in agreement with local organizations and communities to increase the resilience to floods and drought. The participation and engagement of local stakeholders will facilitate the adoption of the strategies and subsequently result in long-term sustainability.

#### **Outcome 3.1 Improve information base and practices related to water resource management and climate change adaptation**

Under Outcome 3.1, Existing adaptation measures and strategies (collection of evidence-based practices and experiences) aligning with AF ESP and gender principles will be discussed at the local level in agreement with local organizations and communities to identify challenges and ways to increase their resilience to floods and drought. The participation and engagement of local stakeholders will facilitate the adoption of the strategies and subsequently result in long-term sustainability.

Output 3.1.1 Best practices and experiences from other regions and river basins are made to ensure that existing national policies and practices are interoperable in GBM river basin cooperation framework

Activity 3.1.1.1 Conduct a desk study, and hold 10 meetings with stakeholders, to identify the status of climate and future socio-economic changes in the transboundary governance plans, policies and guidelines for flood and drought management in Bangladesh and Nepal

Activity 3.1.1.2 Develop 3 short reports (one for the country and one at the regional level) underlining the strengths together with the identified gaps and additional needs related to climate and development impacts in the GBM regional

Activity 3.1.1.3 Organize and conduct national (4 in total) and 2 regional workshops to review, propose updates and implementation arrangements on existing plans, policies and guidelines on water resources management and climate change adaptation in the GBM Basin.

Activity 3.1.1.4 Develop and propose long-term actions (through one national workshop and one regional workshop) for strengthening resilience and capacities at transboundary, national and local levels to be implemented by NMHSs and other regional agencies

Activity 3.1.1.5 Collect feedback, suggestions and recommendations from the workshop participants on the links between activities of National Programmes

Activity 3.1.1.6 Identify roles and responsibilities of the individual organizations and define the coordination mechanism to improve the implementation of the water resources management and climate change adaptation measures

Output 3.1.2 Analysis and optimization of benefits of regional water and climate adaptation actions.

Activity 3.1.2.1 Conduct a total of 10 consultation meetings with national stakeholders to gather examples of best practices and approaches for water resources management, flood and drought risks reduction and climate adaptation related measures

Activity 3.1.2.2 Draft reports for each consultation locations (under activity 3.1.2.1) on recommendations for improving regional water and climate adaptation action.

Activity 3.1.2.3 Organize the dissemination (through a national workshop in each country and 1 at the regional level with 50 participants out of which 50% are female) of the report to policymakers and decision-makers

**Outcome 3.2 National adaptation strategies (i.e. NAPs) are fully inclusive of water management issues, address community concerns. Methodology and mechanisms for leveraging and sharing benefits of optimizing adaptation at regional level are in place.**

Under Outcome 3.2, different outputs and activities are mainly to review existing plans, policies and guidelines on the climate change adaptation and disaster risk management and strengthening them based on experiences gathered from the HydroSOS-BaNe project and local collaboration to gather feedback and recommendations for improvement leading to sustainable development.

Output 3.2.1 An inclusive process is developed to ensure that National adaptation strategies explicitly address water relevant instruments and strategies. Inclusive approaches are operational to include local communities.

Activity 3.2.1.1 Prepare/suggest updates to frameworks (1 each at national level and 1 at the regional level) for adapting the National adaptation strategies with safeguard actions on long term water resources management, climate change adaptation and disaster risk reduction with local stakeholders

Activity 3.2.1.2 Conduct community-based workshops (10 each at the national level and 3 at the regional level to share results) with agencies, local communities/ organizations, and other relevant stakeholders to identify and prioritize adaptation measures

Activity 3.2.1.3 Collect feedback, suggestions and recommendations

Activity 3.2.1.4 Propose national and local level action plans at local and national levels to review and improve the National Adaptation strategies together with the local communities

Output 3.2.2 Regional mechanism for adaptation cooperation on HydroSOS established and operational. Periodic review and updates of the mechanism are agreed on by riparian states.

Activity 3.2.2.1 Organize and conduct workshops (10 at the national level and two at the regional level) to disseminate the results of Hydro-SOS EWS and associated products on climate adaptation for the GBM

Activity 3.2.2.2 Collect feedback, suggestions and recommendations from the workshop participants on the links between activities of National Programmes and the HydroSOS-BaNe project

Activity 3.2.2.3 Identify roles and responsibilities of the individual agencies or organizations at the 10 locations and define coordination mechanisms to review and update the implementation of the climate change adaptation measures based on good practices identified in the GBM riparian countries.

For Bangladesh and Nepal, the BMD, BWDB, and DHM (the executing partners) took the lead for national stakeholders' consultations mainly to identify and agree on the below set of activities (under each output) based on the gaps and needs identified that will be implemented at local, national and regional levels. Also, During the EIA and SIA studies, each relevant agency in both countries was presented the list of activities, outputs and outcomes generated to assess possible social, environmental and gender specific risks. In case of possible risks, mitigation or management measures will be identified and added into the Environmental and Social Management plan (ESMP)

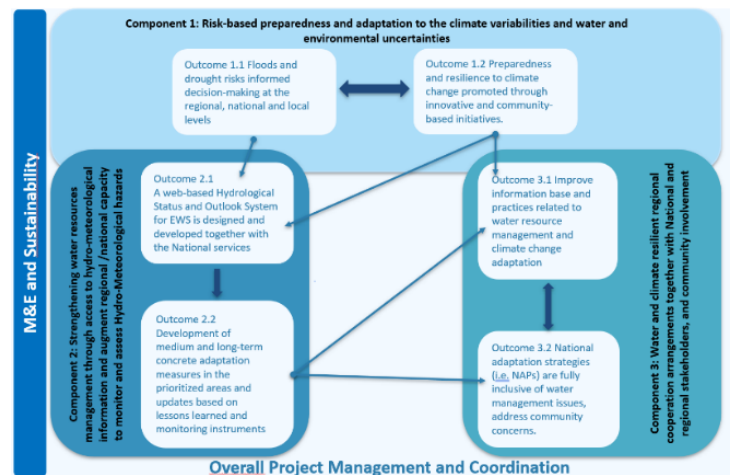


Figure 19: Linkages between different components, outcomes and outputs of the HydroSOS-BaNe project

### B. Describe how the project /programme would promote new and innovative solutions to climate change adaptation, such as new approaches, technologies and mechanisms.

The development and implementation of a free, open-source, and sustainable HydroSOS-BaNe will aim to augment the operational capabilities of National Meteorological and Hydrological Services (NMHSs) and institutions responsible for water planning, management, and disaster-risk reduction. The aim will be to develop an innovative system operating on a daily, weekly, and monthly timescales capable of providing: 1) An indication of the current basin-wide hydrological status (including: groundwater, river flow, soil moisture, cryosphere); 2) An appraisal of where this status significantly deviates from the 'normal' (for example, indicating drought and flood situations); 3) An assessment of where this is likely to get worse over coming months and season. HydroSOS-BaNe will bring together existing tools and approaches to develop composite products of hydrological and meteorological status and outlook through the implementation of the WMO HydroHub (enhancing hydrological monitoring (through the uptake of innovative technologies and approaches) and building capabilities) and World Hydrological Observing System (WHOS)<sup>43</sup> mandate of standardization of hydrological metadata, data and information management system access and exchange. A detailed inventory of existing methodologies, equipment (hardware and software), skills and operational procedures in the GBM targeted countries will be conducted to build on available tools and products.

The applicability and effectiveness of the proposed HydroSOS-BaNe system will be tested in various pilot sites selected by the participating countries to incorporate feedback and suggestions of end-users. Other project outcomes will include development of floods and drought risk maps using the local, national and global data and impact-based forecasting and warning services. There have been studies in the past to understand characteristics of floods and drought in the GBM basin countries. Floods can be predicted successfully with lead-times ranging from several days to even a few weeks in some cases. However, a regional approach will ensure information is shared between the respective agencies of the countries and is further developed for end-users to support timely decisions. Understanding of a slow-setting drought is in particular constrained due to lack of regional datasets and standardization in analytical methods and interconnectedness between different types of droughts namely meteorological, hydrological and agricultural. The HydroSOS-BaNe project will focus on integration these various drought types and provide support in drought monitoring and prediction from monthly to sub-seasonal to seasonal outlooks. It will aim to standardize processes followed across countries in the basin for production of hydrological status and outlooks and ensure region wide collection and dissemination of information for climate change adaptation measures. The most vulnerable elements of the basin; human and environmental resources such as water, fish, minerals and agriculture etc. need long lasting, innovative, and coordinated measures to ensure sustainable development of the area.

**Innovations under component 1:** The floods and drought risk maps, integrating environmental indicators to the impact on human and properties approaches, will be open-source and thus facilitate mainstreaming of results into other initiatives relating to floods and drought management or generally development processes in the target countries. Risk maps will be developed for both current and future projected climate changes and will be crucial for generating impact-based forecasts, for example for extreme floods and drought events. Coordinating with the countries will help promote adoption of risk assessment/mapping methodologies by other countries in the GBM (South Asia in general) which are also prone to floods and drought events. Community based flood management including nature-based solutions and gender mainstreaming in the selected communities will be useful to identify and design innovative solutions relating to risks identification, adaptation measures and dissemination of warnings within communities and at local levels.

Examples of locally led adaptation actions through various HydroSOS-BaNe project will include:

- Communities and individuals raising the level of houses to protect their lives and properties from flood hazards maps and awareness program
- Building of temporary structural measures such as dikes and levees, diversion of flood water etc.
- Changing the agriculture patterns e.g., use of crops withstanding the excess water or reduced water
- Enhanced water security with a focus on innovative water distribution and storage in water scarce rural areas, including through rainwater harvesting systems, solarized water systems, enhanced household water treatment and storage.
- Promoting integrated water resource management in both drought and flood-prone landscapes through nature-based solutions such as watershed restoration, water and soil conservation measures.

<sup>43</sup> <https://public.wmo.int/en/our-mandate/water/whos>

Nature-based or green solutions will also be designed such as multipurpose green infrastructures, keeping in mind that they should be beneficial not only from the environmental, but also from the perspective of economic and social as well. Take for example, earmarking areas that get flooded during heavy rains toll be used for livelihood purposes such as for temporary fishing during a monsoon period and recreational areas during dry season.

**Innovation under component 2:** An integrated and state-of-the-art approach to flood and drought early warning systems is an immediate priority for the GBM countries (especially Bangladesh and Nepal) where timely and relevant information are lacking for impending hydro-meteorological hazards. In these countries during a flooding situation in one part, there can be a drought in another part of the country. An integrated approach to floods and drought monitoring and early warning systems will support national forecasters to observe and generate useful early warning services to the stakeholders. It must be underlined that the methods for producing warnings will differ depending on the characteristics of the hazard (flood or drought), as both hydrological extremes differ in their spatial and temporal distribution. Floods are relatively rapid events, caused by intense precipitation, limited in time and affecting localized areas as compared to drought. Whereas drought in contrast is a slowly developing phenomenon and might have a much-distributed impact both in area and time. On the one hand, the data needed to describe both phenomena can be partially shared, such as meteorological, hydrological and agronomical parameters. On the other hand, the methodology to forecast the two phenomena varies considerably and depends on the availability of different types of meteorological forecasts (from nowcasting for short pluvial events to seasonal and sub-seasonal forecasts for drought onset). The HydroSOS end-to-end hydrological and meteorological monitoring, forecasting and disseminating system will be innovatively designed to bring together existing knowledge, tools and approaches to develop composite products of hydrological and meteorological status and outlook through the implementation of the WMO Hydrohub (enhancing hydrological monitoring and data exchange) and World Hydrological Observing System (WHOS) mandate of standardization of data and information management systems. A detailed inventory of existing methodologies, equipment (hard and software), skills and operational procedures in the GBM countries will be conducted to build on available tools and products. The proposed system will provide possibilities to receive information from the users (crowdsourcing) about their observations during the floods and drought events. The web-based early warning system will be made compatible and scalable to integrate other hazards in future, such as fire, diseases etc.

**Innovative approach under component 3:** The project will bring together policymakers and decision makers to review, develop and refine existing policies on water management and disaster risk management following experiences and lessons learned from the outcome of component 1 and 2. This will allow developing regional/transboundary water management and climate adaptation plans and guidelines instead of country specific ones. Flood management solutions will be designed with communities, benefiting from existing capacities and traditional knowledge, together with recent innovations and lessons learnt from similar situations. Besides, the project will provide support to land-use planning, alongside national and local authorities, taking into account national and local policies (environmental regulations, building codes, etc.), to areas at risk and help minimizing risks of disasters in coherence with local requirements.

**C. Describe how the project would provide economic, social and environmental benefits, with particular reference to the most vulnerable communities, and vulnerable groups within communities, including gender considerations. Describe how the project would avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy of the Adaptation Fund**

The Project will be beneficial in general, providing vital support to the most marginalized sections including those dependent on subsistence farming. Being one of the poorest regions in the world, people's livelihoods in GBM basin region are critically linked to climatic variation and extremes such as flood and drought. The major economic, social, and environmental benefits are highlighted here.

Table 8: Economic, Social and Environmental Benefits from the HydroSOS-BaNe project

Economic Benefits	Social Benefits	Environmental Benefits
<ul style="list-style-type: none"> <li>● Water security/management and economic growth are closely linked, and the project envisages considerable benefits from this approach</li> <li>● Availability and access to surface/groundwater will result in higher farm productivity, increase in income, creation of new assets and growth of local and regional economy.</li> <li>● An effective flood and drought EWS will help in taking adaptive measures such as farm practices, crop selection/adoption, harvest timing etc. It will build resilience into livelihoods and contribute to local economy</li> <li>● The GBM river plains are the region's food basket and effective management holds the key to ensuring food security. Rice and Wheat; the main staple foods together account for over half the dietary energy; and these crops require a considerable amount of water.</li> <li>● Water is an important input for other economic activities including household and commercial water use, hydropower generation and ecosystem services. The project will drive development and industrial growth in the GBM region.</li> <li>● Hydropower is both economical and renewable and the GBM basin carries immense potential for hydropower development.</li> <li>● Improved water management ensures access to sanitation, health and environmental sustainability.</li> <li>● The project will supplement cooperation among riparian</li> </ul>	<ul style="list-style-type: none"> <li>● More than 10 million people will benefit in terms of access to EWS service in order to adapt to climatic variation and climatic extremes such as flood and drought</li> <li>● Development of an inclusive EWS for climatic hazards will ensure participation and access of the most vulnerable groups including those with disability, women, senior citizens and children.</li> <li>● Emphasis on community participation in project conception/design and project monitoring will contribute to building local network, voluntary groups, ownership/accountability and sustenance</li> <li>● Inclusion and training of indigenous groups, Community based and Non-Government Organizations to carry forward the initiatives beyond project phases</li> <li>● It will help address ongoing large scale out-migration and strengthen social institutions</li> </ul>	<ul style="list-style-type: none"> <li>● The project with its nature-based solution approach will promote appropriate adaptation measures and help maintain ecological balance for the entire basin</li> <li>● Efficient water management mechanisms and corresponding practices will foster sustainability, for example, through appropriate irrigation methods, crop choices etc.</li> <li>● Increased understanding of climatic changes and its relationship with natural resources including water and environment</li> <li>● Increased hydropower generation will contribute to reduction in non-renewable energy sources</li> <li>● There will be more systematic measures to mitigate land degradation and soil desertification</li> </ul>

countries leading to increased trade and navigation		
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A final Environmental and Social Management Plan (ESMP) has been developed in consultation with the primary stakeholders at the regional, national and local levels and is included in Annex 3. ESMP will delve into the impact analysis of the proposed project activities and identify potential undesirable effects during implementation so that they can be addressed with suitable measures. There is a formal mechanism available within ESMP to report any grievances arising out of project activities directly to the project implementing authorities and funding agencies

**D. Describe or provide an analysis of the cost-effectiveness of the proposed project and explain how the regional approach would support cost-effectiveness.**

The proposed project is an innovative solution to deal with challenges arising from inadequate water resource management, disaster risk reduction and building community resilience through increased farm income, inclusive growth, participative resource sharing, and gender sensitization. The cost-effectiveness analysis includes various short-term benefits such as prevention and minimization of losses from hydro-meteorological hazards, and availability and access to impact-based EWS. It further includes strengthening observational networks, modeling capabilities, and communication infrastructure. In the medium-term, climate adaptation and disaster risk mitigation planning will be augmented through the development of risk maps, climate adaptation measures such as climate resilient cropping, flood level marking, development of the DRR-based local economy and creation of social institutions etc. In the long-term perspective, there will be optimal use of water resources leading to the prevention and mitigation of floods and droughts, ecological restoration, and formulation and implementation of policies for making communities adapt to climate changes.

Bangladesh and Nepal cover a major portion of the Ganga Brahmaputra Meghna (GBM) River Basin and both face challenges stemming from its socio-economic and ecological context leading to inadequate water resources management. Given the high vulnerability of the region due to its socio-economic and ecological context, this project focuses on developing integrated, climate-resilient water management strategies. These include establishing a robust Early Warning System (EWS), improving transboundary cooperation, and enhancing community-based disaster risk management. A regional approach is essential to bring into alignment a common and integrated approach that rests on mutual interest, common concerns, and considerable benefits for the participating countries. Transboundary river systems such as GBM Basin require a regional approach without which effective management will be extremely difficult. On the other hand, a regional approach provides scope for data sharing on a real-time basis and facilitating disaster response and execution of risk reduction measures.

The HydroSOS project's Environmental and Social Impact Assessment (ESIA) study emphasizes the importance of supporting the traditional structural measures, such as embankments, fences, and dikes, by considering non-structural measures mainly EWS, risk profiles in relation to climate change scenarios, capacity development, community-based approaches etc. Given the inherent uncertainties of how climate change will alter hydrological regimes and the local expression of these inevitable changes, it is crucial to implement measures that provide both immediate and long-term adaptation benefits. This approach contrasts with costly, short-term, and infrastructure-oriented disaster risk reduction methods.

**Bilateral Partnerships and Last-Mile Services**

A key element of the cost-effectiveness of this approach is the deepening of bilateral partnerships on last-mile weather, water, and climate services. Leveraging and sharing expertise and best practices from both countries can generate reliable information, translate it into user-specific advisories, and disseminate it to last-mile users for socio-economic and environmental benefits. Research studies show that early drought response, combined with safety net transfers and resilience-building, is cost-effective. A DfID-funded study found benefit-to-cost ratios ranging from 2.3:1 to 13.2:1, depending on the country, demonstrating that resilience efforts offset their costs. Farmers who adapted their agricultural practices based on weather advisories in India increased their annual income by 25 to 53 per cent. This collaborative approach marks a significant shift from previous practices in silos to a more holistic approach, as seen in the HydroSOS-BaNe project.

**Enhancing Climate Adaptive Capacities at local level**

The proposed project aims to cost-effectively enhance the climate adaptive capacities and resilience of communities facing hydro-climatic risks. By integrating local, national, and regional adaptation strategies and implementation mechanisms, it focuses on the comprehensive monitoring and management of water resources. Floods and droughts, prevalent in both countries, necessitate a robust, cost-efficient solution. At local level, communities will develop self-help capabilities and adaptation measures (early warning system, risk knowledge, local level plans for emergency situation, raising of house level due to flood marking, changing crop patterns, creating or re-establishing flood plains which increase flood management capacity and support biodiversity and habitat conservation objectives; Improving preparedness and contingency planning to deal with risks (including climate); etc.)

**Strengthening National Services**

The project will strengthen the capacities of the National Meteorological and Hydrological Services (NMHSs) through an innovative and tailored Regional Hydro-Meteorological Early Warning System, providing short-term and seasonal forecasts. This system will be embedded into a Long-term Integrated Water Resource Information System. By fostering cross-border collaboration, this initiative will enhance the overall impact by leveraging shared resources and knowledge. Concrete adaptation actions, developed through a participatory process, will be executed in an integrated manner. This cross-border collaboration ensures the sustainability and effectiveness of the project, ultimately leading to a more resilient and adaptive response to hydro-climatic challenges.

### Support to Climate Change Impact and Historical Context

Between 2011 and 2022 in Nepal, there were 1,811 flood-related incidents, resulting in 876 deaths and 209 injuries. Additionally, 65,295 families were affected, 563 people were reported missing, 11,787 private houses were completely destroyed, and 42,060 private houses were partially damaged<sup>44</sup>. The Post Disaster Needs Assessment (PDNA) estimated that the total damage caused by floods is about USD 584.7 million, with the total recovery needed to be estimated to be about USD 705.1 million<sup>45</sup>.

Flooding in Bangladesh causes an annual loss of around USD 1 billion. Furthermore, increasing drought periods in Bangladesh, exacerbated by climate change, threaten significant agricultural losses by 2050. Wheat production may decline by up to 32%, maize productivity by 20%, and other crops like sugarcane, soybeans, and sorghum by 7-10%, resulting in a cumulative loss of USD 36 billion (3.1% of annual agricultural GDP)<sup>46</sup>.

The project will provide preparedness and cost-effective adaptive measures to reduce the socio-economic and environmental impacts of floods and drought in the two targeted countries.

The proposed project for the GBM River Basin represents a cost-effective approach to enhancing climate resilience and water management in one of the most vulnerable regions in the world. By combining risk mapping, capacity building, improved water management, and regional cooperation, the project addresses the root causes of vulnerability and promotes sustainable development. The potential economic benefits of the project—ranging from avoided asset losses and increased economic productivity to enhanced resilience and reduced costs of non-cooperation—far outweigh the initial investment costs. Furthermore, the project's focus on community-based approaches and long-term sustainability ensures that the benefits are not only immediate but also enduring, making it a highly cost-effective and strategic investment for the region.

**Table 9: Analysis of the cost-effectiveness of the proposed project**

HydroSOS-BaNe project component	Component Cost (USD)	Beneficiaries (Approximately) through the proposed project	Proposed project beneficiaries and benefits	Alternatives to proposed approach and cost (USD)	Potential social and environmental risks associated with the Alternative approaches (without the HydroSOS-BaNe project) as discussed with the Stakeholders of Bangladesh and Nepal
Risk-based preparedness and adaptation to climate variabilities, water use stresses and environmental uncertainties	3,000,000	Directly 100,000 Indirectly 10,000,000	Development of preparedness and adaptation measures based on dynamic risk assessment and risk-based plans. The Global Commission on Adaptation found that every 1 USD invested in adaptation could result in 2 USD–10 USD in net economic benefits. <sup>47</sup>  Differential risk identification and prioritization for vulnerable sections including gender, elderly, disabled.  Capacity building at the local community level for making use of risk maps and available information  Integration of emerging climate risks into development planning.	Disaster risk reduction measures such as resettlement of vulnerable communities, involve much higher cost, but with limited benefits and detrimental environmental consequences. There is certainty that if DRR is properly designed and implemented, then it can certainly save more money than response could. <sup>48</sup>  The approximate cost for developing structural disaster risk reduction measures in the selected vulnerable will be around 300 Million USD  Conventional risk maps fail to incorporate climate change induced risks and thus will be ineffective	Lack of social security, and livelihood options. Cultural differences in the new locality. Acquiring lands for resettlement due to already populated areas and construction of houses will be costly and might be prone to other hazards. Houses constructed in the risk areas are impacted by growing climate change events. Not having impact-based risk information, leading to economic losses of the population. Displacement can lead to the breakdown of community networks and social cohesion, impacting mental health and well-being. Higher incidence of poverty and inequality due to inadequate support for vulnerable sections during resettlement. Environmental degradation due to large-scale construction activities.
Strengthening water resources management through access to hydro-meteorological information and augmenting regional /national capacity to monitor and assess Hydro-Meteorological hazards	6,000,000	Directly 1,000,000 Indirectly more than 10,000,000	Regional-level data sharing will help better utilization of water resources and climate change events  A regional approach is critical to mitigate hydro-meteorological hazards through an integrated approach to floods and drought monitoring and EWS.  Upgrading Hydro-meteorological information and EWS in the developing world to the standard of these services in the developed world could	National level EWS for flood and droughts are developed separately and operate independently without being integrated at the basin scale  Water resource management framework is country specific and without real time data or meta-data sharing  Techno-centric EWS installed without community consultation and participation leading to lack of effectiveness and ownership	Existing national EWS systems are not designed jointly with the local stakeholders and warning services are not timely and impact specific. Also, regional aspects are not considered for monitoring of weather, water and climate events.  It has been informed by the stakeholders that having timely warning advisories on weather and water will improve 50 % of livelihood or agriculture production, 90 % saving of lives or injuries to population. Construction of dams and reservoirs will be costly measures and impact the environmental and ecosystem services in

<sup>44</sup> Adhikari, P. B., & Khanal, N. (2024). Seasonal variations of disasters in Nepal. *Bibechana*, 21(1), 1–11. <https://doi.org/10.3126/bibechana.v21i1.54503>

<sup>45</sup> Post flood Recovery Needs Assessment, Nepal Flood 2017. National Planning Commission, website: <https://www.undp.org/sites/g/files/zskgke326/files/migration/np/PPR-Report.pdf>

<sup>46</sup> UNDRR (2020). *Disaster Risk Reduction in Bangladesh: Status Report 2020*. Bangkok, Thailand, United Nations Office for Disaster Risk Reduction (UNDRR), Regional Office for Asia and the Pacific

<sup>47</sup> Adapt Now: A Global Call for Leadership on Climate Resilience, *Global Commission on Adaptation*, September 10, 2019. <https://doi.org/10.1598/22362>

<sup>48</sup> Cost-Benefit Analysis of Community-Based Disaster Risk. ., Prepare Center, accessed September 11, 2024. [https://preparecenter.org/sites/default/files/cba\\_guidance.pdf](https://preparecenter.org/sites/default/files/cba_guidance.pdf).

			<p>lead to between 300 million and 2 billion USD avoided asset losses annually, an average of 23,000 lives saved each year and between 2-30 billion USD of additional economic benefits each year.<sup>49</sup></p> <p>Participation of communities in designing EWS for floods and droughts. Increasing productivity and better health and utility through access to water resources.</p> <p>Systematic documentation of climatic change effects and filling of gaps in existing observational network</p>	<p>The alternative solution would be to construct dams and reservoirs in vulnerable areas for flood control and irrigation channels, which will approximately cost around 150-300 Million USD, or the next solution would be to reconstruct or retrofit the vulnerable community infrastructure, which would be expensive (approximately 100-150 Million USD) and time consuming due to the need to retrofit in communities and in downstream areas</p>	<p>the countries (in Nepal where most of the rivers are in terrain and mountainous regions) especially use of explosive, removal of houses and cultural heritage etc.</p> <p>Also, the construction of structural measures could impact social and economic sectors as storage of water will not allow populations to use water for irrigation, water use, fishing etc. Also, dams and reservoirs will not provide a guarantee of controlling floods. Alteration of natural water flows can impact downstream ecosystems and agricultural areas.</p>
Water and climate resilient regional cooperation arrangements together with National and regional stakeholders, and community involvement	1,000,000	Directly 1,000,000 Indirectly more than 10,000,000	<p>Operationalization of an integrated Climate adaptation with disaster risk reduction approach at a regional and national levels</p> <p>Community empowerment through involvement in refining national and local policies for effective and efficient implementation of adaptation plan and development practices</p> <p>Sharing knowledge and practices with other communities of the region.</p> <p>Reduced cost for each country of knowledge management, capacity building, research and hydrological planning through coordination and data sharing.<sup>50</sup></p>	<p>Disaster Risk Reduction and Climate Adaptation programs and policies executed separately without synergy and joint strategy.</p> <p>Limited Community involvement and programs without integrating science-based risk mapping and thus failing to be useful.</p> <p>Community knowledge sharing is not provided with other neighboring countries/communities.</p> <p>The development and update of national policies and programmes will cost approximately 10 Million USD without any concrete output and benefit to stakeholders</p>	<p>Existing Policies and plans are not aligned with the needs of local or community stakeholders which might not provide associated socio-economic benefits.</p> <p>Some of the polices and plans at the country level need an update with the involvement of stakeholders from all sectors and at all levels.</p> <p>Inadequate community engagement can lead to a lack of ownership and participation in risk reduction and adaptation measures.</p> <p>Potential for increased vulnerability due to the exclusion of local knowledge and practices in policy formulation.</p> <p>Inadequate regional cooperation can hinder the effective management of transboundary environmental issues, such as water resource management and biodiversity conservation.</p> <p>Lack of integrated planning can lead to missed opportunities for enhancing ecosystem resilience through coordinated adaptation measures.</p>

Given the relative costs and benefits of possible Climate Change Adaptation (CCA) and DRR measures, the project has selected the three least-expensive interventions through EWS and knowledge /capacity building measures, to generate significant benefits in the form of increased safety and economic activities as opposed to significant investment in structural or hard measures.

**E. Describe how the project is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist. If applicable, please refer to relevant regional plans and strategies where they exist.**

The proposed project will contribute to UN Sustainable Development Goal (SDG) target 6.5 to implement integrated water resources management at all levels, including through transboundary cooperation. It also contributes to target 1.5 in building resilience through reduction in exposure and vulnerability for climate related extreme events; target 2.4 to ensure sustainable food production through climate adaptation to drought, flooding, other disasters; and target 11.5 making human settlements inclusive, safe, resilient and sustainable. At the national level, Water Resources Strategy (WRS) and Intended Nationally Determined Contributions (INDCs) and action plan (National Adaptation Plans or NAP and National Adaptation Plans for Action or NAPA) of each country will be taken into account to ensure that project outcomes are consistent and improves water resources management and in turn, reduce flood and drought disaster risks. Regional, national and local water management policies and action plans will be reviewed to ensure that knowledge and experience gained through the project feeds back to the national development policies and plans in the area of livelihood, natural resources management, ecosystem protection, disaster risk management, climate change adaptation and human rights in relation to migration and adaptation. A specific guideline for regional entities or centers will be prepared together with the involvement of the national stakeholders with an aim to build better coordination and collaboration with different agencies of each participating country.

**Table 10: Alignment of project with the regional, national and subnational policies and plans**

<sup>49</sup> Rajesh Kumar Rai et al., "Cost-Benefit Analysis of Flood Early Warning System in the Karnali River Basin of Nepal," *International Journal of Disaster Risk Reduction* 47 (August 2020): 101534, <https://doi.org/10.1016/j.ijdrr.2020.101534>.

<sup>50</sup> "Regional Cooperation: Scoping the Benefits of Transboundary Water Cooperation in the NWSAS Basin," UNECE, accessed September 11, 2024, [https://unece.org/fileadmin/DAM/env/water/meetings/2019/18-19\\_June\\_Tunis/Session\\_5\\_Benefits\\_cooperation\\_1906019\\_FINAL.pdf](https://unece.org/fileadmin/DAM/env/water/meetings/2019/18-19_June_Tunis/Session_5_Benefits_cooperation_1906019_FINAL.pdf).

**Bangladesh**

Policies/strategies /plans	Description	Contribution or advancement through the HydroSOS-BaNe project
National Adaptation Plan (2023-2050)	Bangladesh NAP vision which is conceptualized based on underlying aim i.e., to reduce risk and vulnerability due to the adverse impacts of climate change, and to help fulfil Bangladesh's aspiration to become a climate-resilient nation. Ecosystem resilience in the face of climate change is core to achieving this aspiration, recognizing that ecosystems may be adversely impacted both by anthropogenic impacts and by climate change. Promoting sustainable nature-based solutions that balance economic growth, and environmental sustainability has been sought as a means of ecosystem-based adaptation (EbA).	The project will develop flood and drought risk maps and early warning system which will provide timely warning services to the local stakeholders improving their response capabilities. Also, during community-based flood and drought management activities, locally led sustainable climate change adaptation measures (construction of houses based on historical flood water levels, modified agricultural planting seasons, food security methods etc.) will be implemented. HydroSOS-BaNe project outputs linked are 1.1.1, 1.1.2, 1.2.1, 2.1.1
National Adaptation Programme of Action (NAPA) (2009-Present date)	The project is closely aligned with and will address several National Adaptation Programme of Action (NAPA 2005 & 2009-revised) adaptation strategies, namely Strategy 2 – Providing drinking water to communities to combat the effects of climate change (Output 1.3); Strategy 3 – Capacity building for integrating climate change into land-use planning, infrastructure design and conflict management (Outputs 4.1. and 4.2); Strategy 4 – Disseminating climate change and adaptation information to vulnerable communities (Outputs 2.4 and 4.2); Strategy 5 – Constructing flood shelters to cope with enhanced recurrent floods (Output 2.1); Strategy 6 – Mainstreaming adaptation into policies and programmes in different sectors (Output 4.1); Strategy 10 – Promoting research on drought, flood and climate-resilient crops to facilitate adaptation (Output 3.1 and 4.2); 11 – Promotion of adaptation to coastal crop agriculture (Output 3.1); and Strategy 15 –Exploring options for emergency preparedness measures to cope with enhanced climatic disasters (Outputs 1.1; 2.1; 2.2; 2.3; and 2.4). NAPA 2009 emphasized on four basic national security issues of Bangladesh i. e. a) food security, b) energy security, c) water security, and d) livelihood security (including right to health) and respect for local community on resource management	Risks maps for current and projected climate will allow to understand the impact area due to flood and drought events HydroSOS-BaNe project outputs linked are 1.1.1, 1.1.2, 1.1.3, 1.2.1, 2.1.1,2.2.1, 3.1.1, 3.1.2
Bangladesh Environment and Climate-Resilient Sustainable Development (Vision 2021)	Under the Bangladesh Environment and Climate-Resilient Sustainable Development (Vision 2021), the goal is that the livelihoods of Bangladesh's population will be self-sustaining through development that ensures a healthy environment and the welfare of future generations. Climate change is a specific focus of this vision, i.e.: i) climate change adaptation in the agriculture sector; and ii) mitigating the natural hazards and threats imposed by climate change. Several elements of the project are consistent with Vision 2021, including improving resilience against the increased intensity of climate-induced disasters (Outputs 1.1; 2.1; 2.2; 2.3 and 2.4) and the dissemination of climate-resilient agricultural practices (Output 3.1).	Flood and drought risk maps with environmental indicators such as wetlands, protected areas etc. will be developed for climate resilient ecosystem system. The risk maps layers will be visualized under the HydroSOS EWS in order to assess the impact of floods and drought on protected areas, wetlands etc. Also, long term improvement of the environmental and ecosystem system will be carried out through the update of national and regional policies, plans and guidelines etc. HydroSOS-BaNe project outputs linked are 1.1.1, 1.1.2, 1.1.3, 1.2.1,1.2.2 2.1.1,2.2.1, 3.1.1, 3.1.2
The 8th Five Year Plan (7th FYP) (2021-2025) of Bangladesh	The 8th FYP outlines new strategies, institutions and policies, while strengthening the existing ones, to complete Bangladesh's agenda of achieving the social and economic outcomes of the country's Vision 2025. Several initiatives under the 8th FYP are consistent with the project and are specifically targeted to people living in Bangladesh.	The component 3 of the HydroSOS-BaNe project will contribute to the implementation of the 8 <sup>th</sup> Five Year Plan mainly through saving of lives from future climate change events, development of livelihoods through climate change adaptation strategies at local levels Components 1, 2 and 3 will support the advancement of the 8 <sup>th</sup> Five Year Plan.
Bangladesh Climate Change Strategy and Action Plan (BCCSAP) (Initially in 2009 and updated one is expected in 2025)	The BCCSAP is built upon Bangladesh's NAPA and outlines nearly 50 programmes and projects to be implemented by the country over the short-, medium- and long-term. The proposed project is closely aligned with the seven strategic areas of the BCCSAP. These strategic areas, as well as the alignment between them and the project are described below. i) Disaster management. The project will contribute to disaster management at a local and regional level. This will be achieved by developing hazard maps for Bangladesh regions that are vulnerable to climate induced natural disasters (Output 2.1) and increasing the coverage of the other disaster preparedness Programme (Output 2.2). The project will also contribute to greatly improved disaster resilience at a local level by strengthening preparedness and response actions (Output 1.2) and improving stakeholders' knowledge and skills against cyclones and floods (Output 2.2). ii) Research and knowledge management. The project will contribute to improved research and knowledge generation regarding adaptation options in communities	The HydroSOS-BaNe project will develop hazard maps (with return period of 50, 100 years) to understand the potential impacts of floods and drought events. Also, community-based flood and drought management will provide necessary capacity and tools for improving the resilience of populations. The project will identify solutions with inclusive and participatory approaches so that it is utilized and long term sustainable. The proposed project will ensure capacity development activities for risk maps, HydroSOS EWS, community-based activities etc. are carried out at local, national and regional levels. HydroSOS-BaNe project outputs linked are 1.1.1, 1.1.2, 1.1.3, 1.2.1,1.2.2 2.1.1,2.2.1, 3.1.1, 3.1.2

	(Output 4.2) and locally appropriate climate resilient agricultural practices (Outputs 3.1 and 4.1). iii) Capacity building and institutional strengthening. The project will improve the capacity of communities to prepare for and respond to the impacts of increasingly severe climate induced disasters (Outputs under component 1, 2 and 3) and improve agricultural productivity under climate change conditions (Outputs under component 1 and 2). In addition to this, the project will capacitate local government institutions and policy makers to promote climate-resilient approaches in the project areas and at a district level (component 3).	
Bangladesh Climate Change Resilience Fund (BCCRF) Guidelines, 2010	The BCCRF provides grants for climate resilience projects in Bangladesh. The guidelines outline the criteria and procedures for accessing and utilizing funds to implement adaptation measures.	The project will share results of the HydroSOS project (for example, community-based flood and drought management in the pilot locations) to BCCRF so that in future, with funding support from BCCRF, similar tools and approaches could be applied in other communities of Bangladesh where similar needs and issues are identified.
National Plan for Disaster Management (NPDM) (current one is from 2021–2025)	National Plan for Disaster Management (NPDM) 2021-2025 Action for disaster risk reduction: was prepared and is aligned with national, regional and international frameworks including Delta Plan 2100, 8th 5 Year Plan of Government of Bangladesh, SFDRR, Asia Regional Plan for Implementation of the Sendai Framework for Disaster Risk Reduction, Dhaka Declaration 2015 Plus for Disability Inclusive Disaster Risk Management. The plan places importance for disaster risk management linking with rapid urbanization and climate change, and the necessity of DRR for sustainable development, and is flexible and adaptive in cognizance of the changing nature of risks in Bangladesh.	The HydroSOS project will develop and test the applicability and effectiveness of the EWS and risk maps for Bangladesh and ensuring it supports the preparedness and response activities of the NPDM. Also risk maps with climate scenario will be useful in understanding the growing climate risks for both floods and drought in urban areas and due to urbanization. HydroSOS-BaNe project outputs linked are 1.1.1, 1.1.2, 2.2.1, 3.1.1, 3.1.2
The Bangladesh Delta Plan 2100 Formulation Project (BDP 2100)	The Government has recently adopted the Bangladesh Delta Plan 2100, aimed at gradual, sustainable development through adaptive delta management approach. The plan identifies climate change as a significant future challenge and reaffirms Bangladesh's commitment to both reducing GHG emissions as well as lays the foundation for climate adaptation initiatives for the following decades. It specifically identified 52 climate change adaptation projects for enhancing climate resilience of the delta. The project will specifically support the climate change adaptation practices and approaches	The HydroSOS-BaNe project will support and improve the climate change adaptation practices in Bangladesh primarily through integrated flood and drought early warning systems, risk maps, locally led adaptation measures (raising of houses level with flood marking, improving farming activities, timely warning for saving agriculture crops etc.) Components 1, 2 and 3 will contribute to the advancing of Bangladesh Delta Plan
Mujib Climate Prosperity Plan, climate inclusive updated National Environment Policy (2018),	“Mujib Climate Prosperity Plan” for Bangladesh for mobilizing financing, primarily through international cooperation, for implementing renewable energy and climate resilience initiatives, thus contributing to both climate change adaptation and mitigation. The draft plan identifies several key initiatives, which focus on renewable energy, energy storage infrastructure, power grid modernization, establishing carbon market regime etc. for future-proofing locally led adaptation outcomes, and enhancing MSMEs.	The HydroSOS project will partly support the Mujib Climate Prosperity plan mainly ensuring the climate resilience is improved through EWS, understanding growing risks and identifying measures for prevention or management and empowering populations with locally led adaptation measures. Component 1, 2 and 3 related activities will contribute to advancing the plan and policies
updated Standing Order on Disaster (2019)	The objective of the formulation of the Standing Orders on Disaster (SOD) is to inform all concerned about their roles and responsibilities at every stage of disaster risk management. As per the SOD, each ministry, division, department and agency will prepare its own detailed work plan to perform its responsibilities and functions efficiently as mentioned in the Standing Orders; and will take necessary measures to implement it as per their own duty and capacity.	The project through the pilot testing of the EWS will test the national emergency plan to ensure the roles and responsibilities of various institutions are identified and agreed upon for proper cooperation and collaboration. Outputs 2.2.1, 2.2.2 under component 2
Sustainable Development Goals (2022) with National SDGs Communications Strategy and Action Plan (NSCSAP) for the 2024–2030 period,	Bangladesh has made significant progress towards achieving the SDGs, particularly in areas such as poverty reduction, education, healthcare, and gender equality. One of the prioritized goals is on Climate Change and Disaster Management: Bangladesh is highly vulnerable to climate change and natural disasters. The country has prioritized climate change adaptation and disaster risk reduction initiatives. Bangladesh has implemented various projects to enhance climate resilience, promote sustainable agriculture, and protect the environment. In <b>June 2024</b> , a dedicated strategy— <b>NSCSAP 2024–2030</b> —was rolled out to boost SDG awareness and engagement across society	The HydroSOS-BaNe project will improve the SDGs especially the climate change adaptation and disaster management, gender equality, agricultural practices and protecting the environment.
National Agriculture Policy 1999 (amended 2013 & 2018)	Introduced in <b>1999</b> , this policy laid the foundation for food security, crop diversification, mechanization, research, and sustainable agriculture. It was later amended in <b>2013</b> and <b>2018</b> to incorporate climate resilience, biotechnology, export orientation, mechanization, and marketing reforms	The HydroSOS-BaNe will enhance the capacity of the National Meteorological Agency (BMD) in assessing and monitoring the agri-meteorological droughts and support in delivery advisory or potential impacts on agriculture sectors. HydroSOS-BaNe project outputs linked are 1.1.1, 1.1.2, 1.2.1, 2.1.1

National Water Policy (NWP) 1999	Bangladesh has had a formal water management framework since <b>1999</b> , operationalized through a long-term implementation roadmap (NWMP) from <b>2001 to 2025</b> , targeting agriculture, flood resilience, drinking water, and ecosystems.	The HydroSOS products will provide streamflow status, forecasts (0-5 days) and outlook (sub-seasonal to seasonal) supporting various sectors (water resources, dams operators, water utility companies etc.) with information for enhanced services and decision making for improved economic activities. Also risk maps and climate scenarios will provide information for future planning of water resources and irrigation channels. HydroSOS-BaNe project outputs linked are 1.1.1, 1.1.2, 1.2.1, 2.1.1
Nationally Determined Contributions (NDCs – Updated) 2021	Adaptation measures in the NDCs involve enhancing early warning systems, disaster management, water resources management, climate-resilient agriculture, and surface water use.	The project will develop flood and drought risk maps and early warning system which will provide timely warning services to the local stakeholders improving their response capabilities as well as development planning and processes linked to water resources management, climate resilient agriculture and surface water use HydroSOS-BaNe project outputs linked are 1.1.1, 1.1.2, 1.2.1, 2.1.1, 3.1.1, 3.1.2

## Nepal

National Adaptation Plan of Nepal (2021–2050)	NAP Nepal has 9 priority adaptation programs. Agriculture and Food security is the top priority and accounting of water availability for irrigation is required for suitable adaptation measures. Water Resources and Energy as well as disaster risk reduction and management are also the priority programs for NAP. The irrigation systems in Nepal are largely managed by Water User Associations (WUA) which play a significant role in the management and operation of irrigation facilities at the local level.	The project will develop flood and drought risk maps and early warning system which will provide timely warning services to the local stakeholders improving their response capabilities. Also, during community-based flood and drought management activities, locally led sustainable climate change adaptation measures (construction of houses based on historical flood water levels, modified agricultural planting seasons, food security methods etc.) will be implemented. HydroSOS-BaNe project outputs linked are 1.1.1, 1.1.2, 1.2.1, 2.1.1
Irrigation Policy 2013	The objective of the Irrigation Policy is to provide year-round irrigation to suitable agricultural land, develop institutional capability for sustainable irrigation management, and to enhance knowledge and skills in the irrigation sector. The policy emphasizes the importance of year-round irrigation services, service-oriented management, and cost-sharing with water users for efficiency and sustainability. The irrigation policy focuses on strategies like floodwater storage and inter-basin water transfer to address climate change impacts. The irrigation systems in Nepal are largely managed by Water User Associations (WUA) which play a significant role in the management and operation of irrigation facilities at the local level.	The HydroSOS products will provide streamflow status, forecasts (0-5 days) and outlook (sub-seasonal to seasonal) supporting various sectors (water resources, dams operators, water utility companies etc.) with information for enhanced services and decision making. Also risk maps and climate scenarios will provide information for future planning of water resources and irrigation channels. HydroSOS-BaNe project outputs linked are 1.1.1, 1.1.2, 1.2.1, 2.1.1
National Action Plan on Climate Change (NAPCC) June 2008.	Given the vulnerability of Nepal's water resources to climate change, efforts are being made to integrate climate change adaptation into irrigation and water resources management. This includes improving the resilience of irrigation infrastructure, incorporating climate change considerations into water allocation and planning, and promoting climate-smart water management practices.	The HydroSOS-BaNe project will develop hazard maps (with return period of 50, 100 years) to understand the potential impacts of floods and drought events on water resources. Water resources assessment and monitoring will be carried out for developing the HydroSOS system which will support in the services related to irrigation, water utility, hydro power etc. supporting the NAPCC.
National Five-year development plan (NDP) 2024-2029-Planning Commission	<p>Vision and Goals: The NDP sets out a vision for Nepal's development and establishes goals and targets to be achieved over the five-year period. It aligns with the broader national development agenda and priorities.</p> <p>Sectoral Plans: The NDP covers various sectors of the economy and society, including agriculture, energy, infrastructure, education, health, tourism, environment, and social development. It outlines strategies, policies, and programs specific to each sector to address challenges and achieve desired outcomes.</p> <p>Socio-economic Development: The plan focuses on promoting inclusive and sustainable economic growth, poverty reduction, job creation, and improving livelihoods. It aims to strengthen infrastructure, enhance productivity, and enhance social services to uplift the standard of living for all Nepali citizens.</p> <p>Regional and Local Development: The NDP recognizes the importance of regional and local development and aims to bridge regional disparities in terms of economic opportunities, access to services, and infrastructure</p>	The HydroSOS-BaNe project will improve the implementation of NDP especially the socio-economic development, gender equality, agricultural practices and protecting the environment. This is supported under component 3 of the proposed project

	<p>development. It emphasizes decentralized planning and the participation of local communities and governments in the development process.</p> <p>Cross-cutting Themes: The NDP incorporates cross-cutting themes such as gender equality, social inclusion, environmental sustainability, and climate change adaptation. It highlights the need to mainstream these issues across sectors and ensure equitable development for all segments of society.</p>	
<p>Agriculture Development Programs (Latest one - <i>Fifteenth Plan</i> (2019–2024))</p>	<p>Nepal's agricultural sector is critical for rural livelihoods. The government, along with non-governmental organizations (NGOs) and development partners, implements various programs to promote agricultural productivity, enhance market access, and providing training and technical support to farmers. These initiatives aim to improve rural incomes and food security.</p>	<p>The HydroSOS EWS together with the risk maps will provide the impact-based forecasts on agriculture sector for any floods and drought events. This will be critical for decision making on farming, cropping and harvesting of crops. Also, risk scenarios will provide better understanding of future climate change events and identify measures for mitigating or managing negative consequences.</p>
<p>Sustainable Development Goals (SDG) (2016–2030)</p>	<p>Gender equality and women's empowerment: Nepal is committed to promoting gender equality, women's empowerment, and the elimination of all forms of discrimination and violence against women and girls. Ongoing efforts aim to enhance women's participation in decision-making processes and ensure equal opportunities in education, employment, leadership, and governance</p> <p>Sustainable agriculture and food security: Nepal is working towards promoting sustainable agriculture practices, enhancing food security, and improving the livelihoods of rural communities. This includes increasing agricultural productivity, promoting climate-resilient farming techniques, and ensuring access to markets and resources for small-scale farmers.</p> <p>Conservation of ecosystems and biodiversity: Nepal is committed to preserving its rich biodiversity, protecting ecosystems, and promoting sustainable natural resource management. Efforts are being made to conserve forests, protect wildlife, manage water resources, and promote sustainable tourism.</p>	<p>The HydroSOS-BaNe project will improve the SDGs especially the climate change adaptation and disaster management at local, national and transboundary levels, gender equality, agricultural practices, food security and protecting the environment.</p> <p>Also, capacity development on risk maps and nature-based solutions will develop understanding for conservation of ecosystems and biodiversity</p>
<p>National Adaptation Programme of Action (NAPA) 2010, and National Framework on Local Adaptation Plans for Action 2011</p>	<p>The Nepal NAPA identified nine priority areas for adaptation action based on a thorough assessment of climate change impacts and vulnerability:</p> <p>Agriculture and food security: Addressing the impacts of climate change on agriculture, including changes in rainfall patterns, temperature, and increased frequency of extreme weather events.</p> <p>Water resources: Focusing on adaptation measures related to water availability, water supply, and water management in the context of changing hydrological conditions.</p> <p>Forests and biodiversity: Protecting and managing forests and biodiversity to enhance their resilience to climate change and to support the livelihoods of local communities.</p> <p>Health: Addressing the health risks associated with climate change, such as the spread of vector-borne diseases and the impact on public health infrastructure.</p> <p>Rural development and infrastructure: Building the resilience of rural infrastructure, including roads, bridges, irrigation systems, and other critical infrastructure.</p> <p>Urban areas and infrastructure: Addressing the vulnerability of urban areas to climate change impacts, including urban planning, infrastructure development, and management.</p> <p>Mountain ecosystems: Focusing on adaptation measures for the fragile mountain ecosystems, including glacial lakes, high-altitude biodiversity, and livelihoods of mountain communities.</p> <p>Disaster risk reduction and early warning systems: Strengthening the capacity for disaster risk reduction and early warning systems to respond effectively to climate-related hazards.</p> <p>Livelihood diversification: Promoting alternative livelihood options and income-generating activities to reduce the vulnerability of communities dependent on climate-sensitive sectors.</p>	<p>Risks maps for current and projected climate will allow the decision makers to understand the impact area due to flood and drought events in the changing climate and develop risks prevention and management strategies at local and national levels.</p> <p>HydroSOS-BaNe project outputs linked are 1.1.1, 1.1.2, 1.1.3, 1.2.1, 2.1.1, 2.2.1, 3.1.1, 3.1.2</p>
<p>National Climate Change Policy, 2019</p>	<p>This policy outlines Nepal's strategic approach to addressing climate change. It emphasizes the need for adaptation, mitigation, capacity building, and international cooperation to reduce vulnerability and enhance resilience to climate change impacts.</p> <p>The policy envisions "a country spared from the adverse impacts of climate change" (p. 5) with a focus on climate justice and the linkages between environmental conservation, human development and sustainability. It addresses both mitigation and adaptation, with the</p>	<p>Flood and drought risk maps will be developed for adopting climate resilient measures. The risk map layers will be visualized under the HydroSOS EWS in order to assess the impact of floods and droughts on population, infrastructures, agriculture, protected areas, wetlands etc. Also, long term strategies for the development of social, economic, environmental and ecosystem systems will be implemented through the review and update of national and</p>

	adaptation component focusing on adaptation and resilience for local communities, in line with the priorities identified in the National Adaptation Programme of Action (NAPA)	regional policies, plans, and guidelines etc. incorporating the outputs and experience from HydroSOS-BaNe project
National Framework on Local Adaptation Plans for Action (LAPAs), 2011	LAPA was developed following an approach “delivery of adaptation services to the most climate-vulnerable areas and people” (p. 2). The LAPA framework aims to ensure that approaches to integrating climate change adaptation and resilience building into development efforts are bottom-up, inclusive, responsive, and flexible. It outlines a process for local adaptation planning that involves sensitization, vulnerability and adaptation assessment, and prioritization of adaptation options, leading to the formulation of a LAPA, which is then integrated into local planning, implemented and monitored (Government of Nepal, 2011c).	The project will develop flood and drought risk maps and early warning system that will provide timely warning services to local stakeholders improving their response capabilities. In addition, during community-based flood and drought management activities, locally led sustainable climate change adaptation measures (construction or raising house foundations based on historical flood water levels, modified agricultural planting seasons, food security methods etc.) will be implemented at the local levels supporting the sustainable planning and development. HydroSOS-BaNe project outputs linked are 1.1.1, 1.1.2, 1.2.1, 2.1.1
Water resources policy, 2019	The policy entails three different levels of government to ensure clarity in the roles and responsibilities related to the use, allocation, and development of water resources through legal instruments, policy measures and institutional development. It focuses on water auditing & accounting and guidance to be followed by the IWRM river basin offices	The HydroSOS products will provide streamflow status, forecasts (0-5 days) and outlook (sub-seasonal to seasonal) supporting various sectors (water resources, dams operators, water utility companies etc.) with information for enhanced services and decision making. Also risk maps and climate scenarios will provide information for future planning of water resources and irrigation channels. HydroSOS-BaNe project outputs linked are 1.1.1, 1.1.2, 1.2.1, 2.1.1
Water Resource Strategy 2002	The Water Resources Strategy was formulated based on policy principles that prioritize the adoption of Integrated Water Resources Management (IWRM) principles, emphasizing resource conservation and environmental protection through holistic management of river basins. The water resource strategy aims to achieve multiple objectives, including reducing poverty, providing access to safe water and sanitation, ensuring food security, generating hydropower, meeting industrial needs, facilitating water transport, protecting the environment, and preventing water-induced disasters.	The Integrated approach to flood and drought management through the HydroSOS initiative is implemented under the overall umbrella of IWRM. The output of the HydroSOS EWS will support in improving the services and decision making for water utility, hydro power generation, water resources management etc.
National Water Plan 2005	The National Water Plan 2005 operationalizes Water Resources Strategy, 2002 aiming to achieve goals of economic development, poverty alleviation, food security, and environmental protection. It is a framework that guides stakeholders for development and management of water resources and services. The short, medium and long-term action plans for the water sector have been developed through this plan.	The HydroSOS-BaNe project will develop hazard maps (with return period of 50, 100 years), Hydrological status and outlook products to understand the potential impacts of floods and drought events on water resources. Water resources assessment and monitoring will be carried out for developing the HydroSOS system which will support in the services related to irrigation, water utility, hydro power etc. supporting the implementation of National Water Plan 2005.
Disaster Risk Reduction National Strategic Plan of Action (2018-2030)	This is the planning framework that covers the entire cycle and stages of disaster risk management. The plan is prepared in line with the Sendai Framework on Disaster Risk Reduction declaration for 2015-2030 and Sustainable Development Goals for 2015-2030.	The project will develop flood and drought risk maps and early warning system which will provide timely warning services to local stakeholders improving their response capabilities Also during community-based flood and drought management activities, locally led sustainable climate change adaptation measures (construction of houses based on historical flood water levels, modified agricultural planting seasons, food security methods etc.) and disaster risk reduction (development of hazard and vulnerability maps, knowledge and awareness etc.) will be implemented. The HydroSOS-BaNe project will improve the SDGs especially the climate change adaptation and disaster management at local, national and transboundary levels, gender equality, agricultural practices, food security and protecting the environment.  HydroSOS-BaNe project outputs linked are 1.1.1, 1.1.2, 1.2.1, 2.1.1
National Disaster Risk Reduction Policy, 2017	The long-term vision of this policy is to contribute to sustainable development by making the nation safer, climate adaptive and resilient from disaster risk. The policy includes the increase in awareness, monitoring of natural and non- natural disasters, climate change adaptation, development of a multi-hazard early warning system for	The HydroSOS project will develop and test the applicability and effectiveness of the multi hazards EWS (monitoring and forecasting of climate change events) and risk maps for Nepal and ensuring it supports the preparedness and response activities of the National Disaster Risk Reduction policy focusing on protecting

	forecast based preparedness and response plan and also encouraging the regional /international agencies for rehabilitation after disaster.	lives, property and the environment. Also risk maps with climate scenario will be useful in understanding the growing climate risks for both floods and drought in urban areas due to urbanization. HydroSOS-BaNe project outputs linked are 1.1.1, 1.1.2, 1.2.1, 2.1.1, 3.1.1, 3.1.2
Water Induced Disaster Management Policy, 2015	It emphasizes water-induced disaster management programs to be aligned with IWRM principle and the river basin development concept; a master plan at national level and at local level to be formulated; and to be prioritized according to short term, medium term and long-term perspective and implemented with active community participation. Provision for classification of land based on effects of flood, landslide and mechanism to identify its use for settlement, economic activities and agricultural purpose.	The Integrated approach to flood and drought management through the HydroSOS initiative is implemented under the overall umbrella of IWRM. The integrated approach will consider the water resources planning, river basin and risk management together to minimize the loss of lives and improve the net benefit from the use of watersheds The output of the HydroSOS EWS will support in improving the services and decision making for water utility, hydro power generation, water resources management etc. HydroSOS-BaNe project outputs linked are 1.1.1, 1.1.2, 1.1.3, 1.1.2, 1.2.1, 2.1.1, 2.1.2, 3.1.1, 3.1.2

### Regional policies and plans for South Asia region

South Asia Hydro-met forum related plans and strategies (2018)	Established in 2018, SAHF brings together the National Meteorological and Hydrological Services (NMHSs) of nine countries—Afghanistan, Bangladesh, Bhutan, India, Maldives, Myanmar, Nepal, Pakistan, and Sri Lanka—to foster cooperation in hydrometeorological service delivery.	The HydroSOS-BaNe project is a strategic complement to SAHF’s regional agenda (formally launched in 2018), addressing the same priorities through: A transboundary hydrological outlook system for the GBM basin and tailored hydromet forecast services and early warnings through Common Alerting Protocol (CAP) for standardized hazard messaging. The project will strengthen Capacity building across national hydromet agencies and direct integration with SAHF’s Hydrology working group and Knowledge Hub HydroSOS-BaNe project outputs linked are 1.1.1, 1.1.2, 1.1.3, 1.1.2, 1.2.1, 2.1.1, 2.1.2, 3.1.1, 3.1.2
Regional NWP Strategy 2025–2030	Developed during early 2025 workshops, this strategy defines regional cooperation priorities and collaboration modalities in weather forecasting across National Meteorological Service providers. Costed action plans under CREWS-South Asia were structured for coordinated implementation	The HydroSOS-BaNe project (Bangladesh and Nepal) can play a critical enabling role in supporting this strategy, especially in the hydrological forecasting domain, by contributing key data, operational tools, and capacity-building aligned with SAHF’s NWP roadmap. The HydroSOS-BaNe project is an applied, operational demonstration of how NWP data can be turned into useful hydro-meteorological services HydroSOS-BaNe project outputs linked are 2.1.1, 2.1.2, 2.1.3
SAARC Action Plan on Climate Change (2011)	Focus on regional cooperation in adaptation, disaster risk reduction, and water resource management.	The HydroSOS-BaNe project strengthens climate resilience in water-dependent sectors, a central goal of the SAARC Action Plan. It promotes data sharing and institutional collaboration across national hydromet services which is a key regional principle. HydroSOS-BaNe project outputs linked are 1.1.1, 1.1.2, 1.1.3, 1.1.2, 1.2.1, 2.1.1, 2.1.2, 3.1.1, 3.1.2
South Asia Regional Cooperative Environment Programme (SACEP) (Late February 1982)	Promotes sustainable water management and climate resilience in South Asia	The project aligns with SACEP’s goal to enhance environmental early warning systems and regional capacity-building. HydroSOS-BaNe project outputs (directly and indirectly) linked are 1.1.1, 1.1.2, 1.1.3, 1.1.2, 1.2.1, 2.1.1, 2.1.2, 3.1.1, 3.1.2

### F. Describe how the project meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc., and complies with the Environmental and Social Policy of the Adaptation Fund.

Relevant social and environmental concerns, laws/regulations, enforcing agencies, and enforced/regulated items in Bangladesh and Nepal have been reviewed and considered during the preparation of the HydroSOS-BaNe project activities. Some of the laws or acts are provided below:

**Table 11: National technical standards, laws or acts of Bangladesh and Nepal**

National technical standards, laws or acts	Description	Components/outputs alignment with the national technical standards
Environmental Act or Law • Environmental Conservation Act, 1995	This act focuses on the conservation and protection of the environment in Bangladesh. It addresses various environmental issues, including pollution control, hazardous substances,	Components 1, 2 and 3 are mainly activities under outputs 1.1.1, 1.1.2, 1.1.3, 2.1.1, 2.1.2, 3.1.1 and 3.1.2. Risk maps and EWS with environmental thresholds will be

<ul style="list-style-type: none"> <li>•Environment Conservation Rules,1997</li> <li>• Environmental Court Act, 2000</li> <li>• The Local Government Ordinance, 1983 and Bangladesh Environmental Conservation Act, 2010</li> </ul>	<p>environmental clearance for development projects, and environmental offenses.</p> <p>Also, Bangladesh Environmental Conservation Act, 2010 which focuses on the conservation and protection of the environment in Bangladesh. It addresses various environmental issues, including pollution control, hazardous substances, environmental clearance for development projects, and environmental offenses.</p>	<p>developed to understand the impacts and identify necessary mitigation and management measures</p>
Bangladesh Meteorological Act, 2018	An act to make provisions for the purpose of issuing accurate meteorological and climate forecasts on timely basis, combating and reducing meteorological disasters, protecting public life and property, proper use of climate resources and making meteorological services strong, consolidated, target-oriented and updated	Components 1, 2 and 3 mainly activities under outputs 1.1.1, 1.1.2, 1.1.3, 2.1.1, 2.1.2, 3.1.1 and 3.1.2
Bangladesh Climate Change Trust Fund (BCCTF) Act, 2010	This act established the BCCTF, which provides financial resources for implementing climate change projects and programs. The fund supports adaptation and mitigation initiatives at the national and local levels.	Components 1, 2 and 3 mainly activities under outputs of community-based flood and drought management for designing future projects to replicate it in other communities and also for implementing national policies and plans on climate change adaptation and disaster risk reduction measures.
Labour Act or Laws, 2006	This act governs various aspects of employment and labor relations in Bangladesh. It covers matters such as working hours, wages, occupational safety and health, labor welfare, trade unions, and dispute resolution mechanisms.	Component 1 through outputs 1.1.1 and 1.1.2 and 1.1.3 will support the development and improvement of livelihood of individuals. Also, participation from the agencies and community members in the project activities will be covered with necessary travel and allowances costs and will ensure that the working hours are not beyond 8 hours. No individual will be hired without pay and payment will be based on national labour pay scales. Child labour will be forbidden, and it will not be accepted by the project partners and national agencies.
Disaster Management Act 2012	Disaster Management Act 2012 and National Disaster Management Policy 2015	Components 1, 2 and 3 mainly activities under outputs 1.1.1, 1.2.1, 1.1.3, 2.1.1, 2.1.2, 2.2.1, 3.1.1 and 3.1.2 through risk maps and HydroSOS will be developed and tested in the pilot locations
Wildlife (Conservation and Security) Act, 2012	This act provides legal provisions for the conservation and protection of wildlife in Bangladesh. It regulates hunting, trading, and possession of wildlife, and establishes penalties for offenses related to wildlife conservation.	The component 1 especially output 1.1.1 will support in identifying vulnerabilities and risks related to environmental and ecosystem services which will be indirectly providing benefits to conservation of species and animals.
Forest Act (1927) (the original act was in 1927 and it was revised in 1973 and later in 1982 as <a href="#">The Attia Forest Protection Ordinance, 1982.</a> )	This act governs the conservation, management, and utilization of forests in Bangladesh. It covers aspects such as forest management, timber harvesting, wildlife protection, and community forestry.	The project component 1 especially through risk maps will allow us to understand the impacts of climate change events on protected areas which need to be maintained and how it could be preserved
Bangladesh water act 2013 and Bangladesh national water policy 1999	The Bangladesh Water Act of 2013 addresses various aspects of water management in the country. It provides a comprehensive framework for the regulation, conservation, and equitable distribution of water resources. The act aims to ensure sustainable use of water, promote integrated water resource management, and establish a system for resolving water-related disputes. Bangladesh National Water Policy of 1999 serves as a guiding document for water governance and development strategies. It emphasizes the need for efficient water allocation, pollution control, and conservation measures, while considering the social, economic, and environmental aspects of water management. Both the Water Act and National Water Policy play significant roles in shaping Bangladesh's approach to water resource management.	The output 2.1.1 HydroSOS EWS with water resources assessment, monitoring and outlook indicators will provide support to efficient use of water resources for social, economic and environmental benefits.

## Nepal

Environment Protection Rules, 2020	<p>This act provides the legal framework to protect the fundamental right of each citizen to live in a clean and healthy environment, provide the victims with compensation by the polluter for any damage resulting from environmental pollution or degradation, maintain a proper balance between environment and development, mitigate adverse environmental impacts on environment and biodiversity and face the challenges posed by climate change in Nepal.</p> <p>It addresses issues such as pollution control, environmental impact assessment, waste management and natural resource conservation. It focuses on sustainable management of the environment with suitable mitigation measures and effective environmental management plans.</p> <p>The regulation has defined a list of projects/activities whether Brief Environmental Examination, Initial Environmental Examination (IEE) or Environment Impact Assessment (EIA) is required. Detailed methodologies for scoping, Terms of Reference, public hearing and reporting mechanism of environmental studies.</p>	Components 1, 2 and 3 mainly activities under outputs 1.1.1, 1.1.2, 1.1.3, 2.1.1, 2.1.2, 3.1.1 and 3.1.2. Risk maps and EWS with environmental thresholds will be developed to understand the impacts and identify necessary mitigation and management measures
Forest Act, 2019	This act governs the protection, conservation, and utilization of forests in Nepal. It regulates activities such as forest management, timber harvesting, community and other forests, conservation of wildlife, environment, watershed and biodiversity.	The project component 1 especially through risk maps will allow us to understand the impacts of climate change events on protected areas which need to be maintained and how it could be preserved
National Women Commission Act, 2017	It formulates and implements necessary programs for protection and promotion of the rights and interests of women and to ensure gender justice through the empowerment of women & end all forms of violence and discrimination against women	Under activities of Component 1 and 2, the proposed project will improve the gender equity and women empowerment through inclusive and participatory approaches. During capacity development workshop on the WMO developed tool: Training Manual for mainstreaming gender in End-to-End Early Warning system for Flood forecasting and integrated Flood Management, gender specific needs and issues before, during and after disaster will be identified and necessary approaches or strategies will be designed. This will help in increasing the participation of women, girls and other vulnerable groups in Flood and Drought management activities as well as in decision making processes.
National Natural Resources and Fiscal Commission Act, 2017	Legal mechanism for mobilization of natural resources, revenue distribution and grant to three tiers of government in Nepal.	Components 1, 2 and 3 mainly activities under outputs 1.1.1, 1.1.2, 1.1.3, 2.1.1, 2.1.2, 3.1.1 and 3.1.2. Risk maps and HydroSOS EWS with social, economic and environmental thresholds will be developed to understand the impacts and identify necessary mitigation and management measures, supporting the natural resources management for human development.
National Dalit Commission Act, 2017	It seeks to conduct study and research on the prevailing legal provisions relating to the Dalit for the protection and promotion of the rights, interests and the empowerment of the Dalit Community,	Components 1 and 2 related activities on risk maps and early warning system will involve Dalit representatives to understand their vulnerabilities to climate change events and how effective warning services will be provided to them
The Social Security Act, (2018)	It makes necessary provisions on the protection of the right to social security of the indigenous citizens, incapacitated and helpless citizens, helpless single women, citizens with disabilities, children, citizens who are unable to take care of themselves and citizens belonging to the tribes on the verge of extinction	Components 1, 2 and 3. The proposed activities will follow the national human rights. Moreover, the proposed project will promote the basic human rights of access to information, water, and food.
National Parks and Wildlife Conservation Act, 1973	This act establishes national parks, wildlife reserves, and conservation areas in Nepal. It provides legal provisions for the protection and conservation of wildlife, their habitats, and biodiversity.	The component 1 related activities on risk maps will identify vulnerabilities, exposure and risks to changing climate and associated events (floods and events) and possibly could identify solutions for the protection of biodiversity through the nature-based solutions.
Water Resources Act, 1992 Water Resources Regulations, 1993	This act regulates the development, utilization, and management of water resources in Nepal. It covers aspects such as water rights, priority order for utilization of water resources, licensing, water quality control, irrigation, hydropower generation, and flood control. This regulation has a mechanism of District Water Resource Committee for licensing of water resources and provision of Water Resources Utilization Inquiry Committee for dispute management.	The Component 2 output 2.1.1 HydroSOS EWS with water resources assessment, monitoring and outlook indicators will provide support to efficient use of water resources for social, economic and environmental benefits. Also, risk maps will be developed to understand the impact on water resources due to flood and drought events.

National Disaster Risk Reduction and Management Act-2017	To protect human lives and properties of the public, private and individual from natural and non-natural disasters by effective disaster risk and management. National Disaster Risk Reduction and Management Authority is established, and disaster management is a shared responsibility of three tier of Government. Rights, Functions and Duties of Province Disaster Management Committee, District Disaster Management Committee, Local Level Disaster Management Committee are clearly defined.	Components 1, 2 and 3 mainly activities under outputs 1.1.1, 1.2.1, 1.1.3, 2.1.1, 2.1.2, 2.2.1, 3.1.1 and 3.1.2 through risk maps and HydroSOS will be developed and tested in the pilot locations
Irrigation Regulation-2000	Provision for registration of irrigation water user's association for construction, management and operation of irrigation systems. Rights, duties and function of irrigation water user's association defined and provision on collection of irrigation service fee. Provision of water allocation to farmers based on water availability on source.	The output 2.1.1 HydroSOS EWS with water resources assessment, monitoring and outlook indicators will provide support to efficient use of water resources and its use for irrigation and water utility purposes.

### G. Describe if there is duplication of project with other funding sources, if any.

The project will ensure that its products and tools build on existing resources, infrastructure, and services available at the national and local levels and thereby avoiding duplication. Some of the existing National level activities (Hydro-Meteo monitoring, forecasting and warning services by the National Meteorological and Hydrological services of the targeted countries) will be considered and data and outputs will be integrated into the proposed HydroSOS system. Synergies and complementarities will be established with completed and ongoing regional and national projects such as WMO HYCOS-HKH, Regional flood outlook for the Ganges and Brahmaputra River basins developed by ICIMOD, South Asia Flash Flood Guidance System (SAFFGS), IUCN BRIDGE GBM etc.

**Table 12: Other completed, ongoing or planned projects and programmes in the region**

Projects/Objectives	Objectives/Description	Possible Synergies/Complementarities
CREWS South Asia Enhancing Multi-Hazard Early Warning Systems and Early Action in South Asia <a href="https://crews-initiative.org/news/unlocking-south-asia-regional-synergies-for-resilience-building-through-enhanced-access-to-early-warning-services/">https://crews-initiative.org/news/unlocking-south-asia-regional-synergies-for-resilience-building-through-enhanced-access-to-early-warning-services/</a> (planned to be from 2025-2029)	Strengthen multi-hazard early warning systems (MHEWS) across South Asia especially through the Hydro-Met forum organized for sharing experience and capacity development	HydroSOS provides hydrological status and outlooks that can serve as core inputs to CREWS-supported MHEWS for floods and droughts in Bangladesh and Nepal. HydroSOS focuses more on technical hydro aspects; CREWS includes broader support to MHEWS in the entire South Asia countries
Green, Resilient, and Adaptive CHT Economy (GRACE)-LoCALplus <a href="https://www.adaptation-fund.org/project/green-resilient-and-adaptive-chattogram-economy-grace-localplus/">https://www.adaptation-fund.org/project/green-resilient-and-adaptive-chattogram-economy-grace-localplus/</a> (2025-2029)	A green, resilient, and inclusive economy in the Chittagong Hill Tracts (CHT) region of Bangladesh by integrating climate change adaptation, natural resource-based livelihoods, and local climate finance. It emphasizes on: - Empowering local institutions through performance-based climate finance (PBCF) - Supporting climate-resilient rural livelihoods - Enhancing ecosystem-based adaptation - Promoting inclusive development, especially for indigenous and marginalized communities - Creating a territorial climate planning framework for the CHT	HydroSOS operates at the national and regional levels (Bangladesh and Nepal), its data and tools can directly support local resilience and climate finance programmes such as GRACE-LoCALplus. For example: If HydroSOS forecasts a high-probability drought in the CHT region for an upcoming season, GRACE-LoCALplus can: <ul style="list-style-type: none"> <li>• Trigger early disbursement of climate finance to vulnerable unions</li> <li>• Support community-led water harvesting or drought-tolerant agriculture projects</li> <li>• Align local adaptation priorities with emerging climate risks.</li> </ul>
LoGIC: Local Government Initiative on Climate Change (Bangladesh) (2022-2026)	Focuses on community- and local government-led adaptation with nature-based solutions, savings groups, women-led enterprises, primarily in the Chittagong Hill Tracts and seven high-risk districts	HydroSOS's hydrological outlooks and impact-based forecasting can feed directly into LoGIC's community-based disaster preparedness plans, enhancing anticipatory action.
Integrating Climate Change Adaptation into Sustainable Development Pathways of Bangladesh <a href="https://www.adaptation-undp.org/projects/integrating-climate-change-adaptation-sustainable-development-pathways-bangladesh">https://www.adaptation-undp.org/projects/integrating-climate-change-adaptation-sustainable-development-pathways-bangladesh</a> (Feb 2017- April 2025)	The project is innovative because it will implement an integrated approach to reduce climate change risks to AEZs and disaster risk management, rather than being comprised of separate and isolated sectoral approaches to addressing the effects of climate	HydroSOS's seasonal outlooks can serve as inputs for adaptive planning at national and sectoral levels (e.g., agriculture, water resources, urban development). Both initiatives focus on strengthening institutional capacities—HydroSOS in technical forecasting, and the adaptation initiative in planning and governance. Enhanced coordination through HydroSOS-BaNe can ensure these capacities are mutually reinforcing.
GEFID 10207 Building climate resilient livelihoods in vulnerable landscapes in Bangladesh (BCRL)EWS; institutional capacity building etc. <a href="https://www.thegef.org/projects-operations/projects/10207">https://www.thegef.org/projects-operations/projects/10207</a> (March 2024- June 2029)	The overarching objective of this project is to improve the resilience of people, communities, and ecosystems to climate change, and improve livelihoods through increased value addition in the agricultural food systems of Bangladesh. Outcome 1.1: Technologies and innovative solutions piloted or deployed to reduce climate-related risks and/ or enhance resilience  Outcome 1.2: Innovative financial instruments and investment models	While certain activities in the HydroSOS-BaNe proposal may appear thematically aligned with those in the GEF-FAO project, there are critical distinctions in scope, scale, geographic coverage, technical depth, and institutional arrangements that ensure complementarity rather than duplication. Based on the extensive desk study and discussion with the national executing partners (BMD and BWDB), it is informed that the GEF FAO project will only provide support in the development of the Floods EWS in the selected pilot areas proposed in the BRACE proposal. However, the HydroSOS-

	enabled or introduced to enhance climate resilience	<p>BaNe will develop the multi hazard EWS for the entire national levels of two countries (integrating existing products and system) and it will be tested at the 10 pilot locations to understand applicability and effectiveness. In the Brace proposal, the EWS will be developed and hosted at the Ministry of Environment focusing mainly on agriculture aspects however it is key to note that the mandate and responsibility for the early warning services is with BMD and FFWC and jointly with WMO as a global UN entity which is a gap presently for improved coordination at the national level. HydroSOS-BaNe will ensure proper coordination and synergies in using the technical human resources, infrastructures, data and information etc.</p> <p>Under the HydroSOS-BaNe project, BMD and FFWC will work with MoDMR and also with the Ministry of Environment to not only provide early warning services for saving lives but also for services (impact to crop lands, infrastructures, dams or reservoirs, protected lands etc.) It is informed that not all national agencies are properly consulted and involved in the BCRL project with clear roles and responsibilities.</p> <p>Both projects will be able to learn from each other in terms of experiences and challenges, especially as stakeholders and partners will be invited to participate in the advisory committee of the HydroSOS-BaNe project. A part of the results and methodologies of GEF BCRL project will be complementary to the HydroSOS-BaNe project as both projects aim at improving early warning: the type of information provided by the early warning system (EWS) could be integrated into HydroSOS EWS. The methodology for climate resilient warnings proposed in GEF BCRL project could be linked to HydroSOS similarly to an experiment on one of the pilot sites. Adaptation solutions of GEF BCRL to improve the resilience of communities and their livelihoods could be integrated while developing Components 1 and 2 and some of them could be further transferred in the different regions of the GBM Basin.</p> <p>Additionally, FAO could be one of the stakeholders to receive sub-seasonal to seasonal warnings and can take an active role to the dissemination of information with a wide range of local stakeholders (farmers groups, insurance company, private companies, etc.), including decision-makers from national/local agencies responsible for Flood and Drought Management.</p>
<p>GEFID 10727 Managing Watersheds for Enhanced Resilience of Communities to Climate Change in Nepal (MaWRiN)</p> <p><input type="checkbox"/> WRM (floods, droughts etc.), NBS etc.</p> <p><a href="https://www.worldwildlife.org/projects/managing-watersheds-for-enhanced-resilience-of-communities-to-climate-change-in-nepal-mawrin">https://www.worldwildlife.org/projects/managing-watersheds-for-enhanced-resilience-of-communities-to-climate-change-in-nepal-mawrin</a></p> <p>(June 2022- August 2028)</p>	<p>The objective of this project is to enhance climate resilience of Indigenous people and local communities in the Marin watershed through nature-based solutions and livelihood diversification. The proposed requested GEF funding will help increase the resilience of the local communities of the Marin watershed in the face of long-term climate change and associated hazards such as landslides, floods, droughts and forest fires by reducing vulnerability, increasing adaptability, and improving the transfer and expansion of locally appropriate nature-based solutions.</p>	<p>This National project in Marin watershed of Nepal will be screened and synergies will be developed on the work proposed on improving vulnerabilities, increasing adaptability and NbS solutions in Nepal by developing implementation partnerships and using the methodologies and approaches proposed by the MaWRiN project partners possibly to other regions of Nepal and Bangladesh.</p> <p>WWF being technical partner of WMO will be invited to join as the technical partners or part of the advisory committee of the proposed HydroSOS-BaNe</p>
<p>GEFID 6989 Developing Climate Resilient Livelihoods in the Vulnerable Watershed in Nepal WRM (floods and droughts)</p> <p><a href="https://www.thegef.org/projects-operations/projects/6989">https://www.thegef.org/projects-operations/projects/6989</a></p> <p>(December 2020 – November 2024)</p>	<p>To develop climate resilient community livelihoods through integrated watershed management practices</p> <p>Outcome 1.1: Technologies and innovative solutions piloted or deployed to reduce climate-related risks and/ or enhance resilience</p> <p>Outcome 1.2: Innovative financial instruments and investment models</p> <p>enabled or introduced to enhance climate resilience</p>	<p>Improved planning and management of water resources will help the communities in increasing their livelihood and (agricultural) production. The HydroSOS-BaNe project will provide necessary information on floods and drought EWS and indicators, making the beneficiaries have timely knowledge and awareness on the impending events. The resilience approaches and methodologies of GEF project could be shared and integrated in the pilot testing locations of other countries of the HydroSOS-BaNe.</p>
<p>GEFID 4551 Community Based Flood and Glacial Lake Outburst Risk Reduction Climate disaster (glacial Lake outburst flood)</p>	<p>The objective of CFGORRP is to reduce human and material losses from Glacier Lake Outburst Flooding (GLOF) in Solukhumbu district and catastrophic flooding events in the Terai and Churia Range. For achieving this objective, the Project has been streamlined into two main</p>	<p>The HydroSOS-BaNe project will fully benefit from the efforts of CFGORRP project in Nepal which is strengthening the Glacier Lake Outburst Flooding (GLOF) observation and warning services in pilot districts of Nepal. The output of CFGORRP will be integrated into the HydroSOS EWS and will be utilized by the national agencies together with other</p>

<p><a href="https://www.undp.org/nepal/projects/closed-community-based-flood-and-glacial-lake-outburst-risk-reduction-project">https://www.undp.org/nepal/projects/closed-community-based-flood-and-glacial-lake-outburst-risk-reduction-project</a></p> <p>(March 2013–December 2019)</p>	<p>components. Component I (GLOF) is specifically aligned towards reducing GLOF risks arising from Imja Lake, and Component II (Flood) aims to reduce human and material losses from recurrent flooding events in the four flood prone districts of Terai. Approximately 96,562 vulnerable people will directly benefit from this project.</p>	<p>global and locally development products for riverine and urban floods. If Glacier Lake Outburst Flooding (GLOF) observation and warning products and services are found effective, it will be expanded to cover also other vulnerable regions of Nepal and Bangladesh.</p>
<p>Integrated River Basin Management (IRBM) in the Hindu Kush Himalayas (HKH) Region/ICIMOD <a href="https://www.icimod.org/event/integrated-river-basin-management-in-the-hindu-kush-himalaya/">https://www.icimod.org/event/integrated-river-basin-management-in-the-hindu-kush-himalaya/</a></p> <p>(December 2019- October 2024)</p>	<p>The overall goal of the Hindu Kush Himalaya-HYCOS project was to contribute to protect lives, livelihoods, property of vulnerable communities, and infrastructure by enhancing flood risk management capacity in the region. For that purpose, the project aimed at establishing a framework for regional cooperation that ensured efficient collection and real-time transmission of hydrometeorological data and the sharing of information for integrated hydrological information systems and aspects of transboundary flood management within the Indus River basins. The data is available on a real time basis from This initiative is preparing focused basin reports on three river basins – Indus, Ganges, and Brahmaputra – to provide recommendations for elevating river basin governance in the HKH. Also, Training mid-level and senior practitioners across HKH region in IRBM</p>	<p>The HydroSOS-BaNe project will benefit from the IRBM-HKH methodologies and tools used for providing recommendations for elevating river basin governance in the HKH and the capacity building activities. Most of the results obtained during IRBM-HKH will be integrated into various activities of HydroSOS-BaNe. Indeed, the trained groups of people of IRBM-HKH project will be contacted and involved in the development of the Transboundary HydroSOS EWS and also in the governance related activities leading to tailored and sustainable strategies for managing climate change extremes and integrated river basin management for water, energy, food, and ecosystem security.</p> <p>The HydroSOS-BaNe project will collaborate with ICIMOD to gain technical expertise in identifying the needs and proposing adequate early warning solutions for GLOF, Snow Melt related floods to be possibly included in the future into the HydroSOS EWS system.</p>
<p>Regional Mainstreaming Water Resilience in Asia and Pacific/ADB <a href="https://www.adb.org/projects/55064-001/main">https://www.adb.org/projects/55064-001/main</a></p> <p>(January 2021- December 2024)</p>	<p>Capacity building to enhance water security and resilience in Asia and the Pacific. It seeks to support a) increased climate resilience in water projects, programs, and policies by facilitating a shift toward climate-resilient and low-carbon development; (b) use information and communications technology (ICT), digital and remote sensing technologies, and innovations.</p>	<p>Component 2 of the HydroSOS-BaNe project will build upon existing water resources monitoring and flood forecasting capacities and integrate the output of the early warning into HydroSOS EWS. This ADB project provides experiences on the challenges, and lessons learnt during the implementation phase of a climate resilience development and address also the issues of the sustainability of the water security. The proposed project team will have consultation to identify synergies and complementarities between activities.</p> <p>Standard Operating Procedure (SOP) will be developed by the proposed project for the sustainability where it could be helpful for the increased climate resilience in water projects, programs, and policies by facilitating a shift toward climate resilient.</p>
<p>Bangladesh Weather and Climate Services Regional Project funded by the World Bank <a href="https://projects.worldbank.org/en/projects-operations/project-detail/P150220">https://projects.worldbank.org/en/projects-operations/project-detail/P150220</a></p> <p>(May 2017- November 2024)</p>	<p>The Project Development Objective of this project is “to strengthen Government of Bangladesh’s capacity to deliver reliable weather, water and climate information services and improve access to such services by priority sectors and communities.”</p>	<p>Component 2 of the HydroSOS-BaNe project will build on the existing weather, water and climate information services and use the existing capacities and integrate the output of the information system into HydroSOS EWS. This will help in better decision making for hydrological and meteorological services for saving lives and strengthening economical activities.</p>
<p>SUFAL II Supporting flood forecast action and learning in Bangladesh <a href="https://www.rimes.int/node/848">https://www.rimes.int/node/848</a></p> <p>(July 2021– December 2023)</p>	<p>SUFAL project focuses on reducing the vulnerability of flood-prone populations in the Brahmaputra-Jamuna basin by strengthening impact-based forecasting and early warning to trigger early actions and funding prior to flood events. The aim is to reduce the impact of floods on communities, improve effectiveness of emergency preparedness, response and recovery efforts, and reduce the humanitarian burden</p>	<p>The HydroSOS-BaNe project will build upon the available EWS with FFWC and improve it to have the impact-based flood forecasting system (mainly supported under Component 2) so as to provide impact-based warning services to the population.</p>
<p>Coastal Resilience through Nature-Based and Integrated Solutions in Asia Pacific (Bangladesh) <a href="https://www.adb.org/projects/54212-001/main">https://www.adb.org/projects/54212-001/main</a></p> <p>(June 2021- December 2025)</p>	<p>Building coastal resilience in Asia-Pacific requires adopting long-term and integrated planning approaches. Given their potential benefits, nature-based solutions are to be considered as part of integrated plans combining grey and green solutions and soft measures such as awareness raising, policy making, land use planning and early warning.</p>	<p>The integrated planning approaches developed through the project favor adaptive management, a risk-based approach, inclusive processes, and consider the full spectrum of coastal resilience in Bangladesh. HydroSOS EWS will ensure the tools and products developed water risk and adaptive management designed and implemented will be assessed and will be integrated in the HydroSOS EWS.</p>
<p>Regional Flood Information System/HKH Hydrological Cycle Observation System (HKH-HYCOS), ICIMOD <a href="https://www.icimod.org/initiative/hycos/">https://www.icimod.org/initiative/hycos/</a></p>	<p>It aims at flood management through data sharing from 28 hydro-meteorological stations including the GBM region</p>	<p>Component 2 of the HydroSOS Ba-Ne project will build on the existing flood forecasting capacities at ICIMOD and integrate the output of the RFIS into the HydroSOS EWS so that the national forecasters from the meteorological and</p>

<a href="https://hydrohub.wmo.int/en/projects/Himalayan-HYCOS">https://hydrohub.wmo.int/en/projects/Himalayan-HYCOS</a> (2015–2019)		hydrological services could use it for analyses with other global and HydroSOS products output.
South Asia Water Initiative/World Bank <a href="https://www.worldbank.org/en/programs/sawi">https://www.worldbank.org/en/programs/sawi</a> (Phase 1- 2009-2012 Phase 2- 2012-2021)	SAWI supported climate resilience and sustainable, fair, and inclusive development by: strengthening awareness and knowledge about regional water issues; enhancing technical and policy capacity, supporting dialogue and participatory decision processes to build trust; and scoping and informing World Bank investments. SAWI worked in the Indus, Ganges and Brahmaputra River basins and in the Sundarbans wetlands, shared by Bangladesh and India. Together, SAWI activities spanned seven countries: Afghanistan, Bangladesh, Bhutan, China, India, Nepal and Pakistan.	The output of the completed SAWI project in Nepal and Bangladesh such as Strategic Basin Planning, Nepal Water Platform, River Management Improvement Bangladesh, Basin modeling and Strengthening Hydro-met Services and DRM in Bangladesh will be reviewed and utilized in the implementation of component 1, 2 and 3. The lesson learned and implementation challenges from the SAWI will not be replicable during the HydroSOS-BaNe project.  The World Bank will be invited during the inception phase of the project to follow the implementation as well as to ensure the methodologies, tools and products are scaled to cover other regions of GBM Basin or in South Asia and South-East Countries.
ADB funded Water resources project preparatory Facility/ Expansion of coverage areas for flood control infrastructure, irrigation and drainage areas <a href="https://www.adb.org/projects/45206-001/main">https://www.adb.org/projects/45206-001/main</a> (April 2013- 2018)	A detailed study for high priority water resources projects undertaken; (ii) environmental, social, and technical capacity of the Department of Water Resources and Irrigation (DWRI) improved; (iii) Irrigation Master Plan updated; and (iv) efficient project management.	The ADB funded project is also planning to setup various water resources infrastructures for floods and droughts in the Nepal region. As the HydroSOS-BaNe project is not going to implement any structural flood control measures, Component 1 of the HydroSOS-BaNe project will develop risk maps and ensure to have details of these water resources infrastructures for improving resilience and capacities of the communities to the climate change events.
Strengthening Integrated Flood Risk Management: Nepal Flood Risk Sector Assessment/ADB Funded <a href="https://www.adb.org/projects/52014-001/main">https://www.adb.org/projects/52014-001/main</a> (2019-2021)	To strengthen Integrated Flood Risk Management (IFRM) solutions, enhancing knowledge and application of IFRM strategies in DMCs. It will provide and promote holistic IFRM solutions, including basin-scale and nature-based solutions.	The proposed project will build on the work carried out by the ADB funded on IFRM solutions designing as both the project is proposing the IFRM strategies for to maximize net benefits from the use of flood plains and minimizing loss of lives, property damage and impact to environment that may include nature-based and other soft approaches. The HydroSOS-BaNe project will assess the technical assistance provided to the participating countries and build on the results to ensure baseline information and solutions designed/proposed are considered during the initial implementation phase especially for component 1 and 2.
Irrigation and Water Resources Management Project Telemetry System <a href="https://dwri.gov.np/iwrmp/images/PCR_final.pdf">https://dwri.gov.np/iwrmp/images/PCR_final.pdf</a> (late-2007 through June 2018)	Establishment of hydrometric stations equipped with telemetric systems on major rivers, tributaries and key precipitation recording locations for management of water distribution systems on the basis of real time data.	The HydroSOS-BaNe EWS project will integrate the real-time data and information from the hydrometric system installed on major rivers, tributaries and other areas for visualization and as well as for hydrological model inputs for developing forecasting and early warning services in the targeted project countries.
Regional flood outlook for the Ganges and Brahmaputra River basins developed by ICIMOD <a href="https://library.wmo.int/doc_num.php?explnum_id=4701">https://library.wmo.int/doc_num.php?explnum_id=4701</a> (2014-On-going)	The project aimed at improving regional cooperation on flood risk management including the installation and operation of 30 upgraded hydrometeorological stations in four countries (Bangladesh, Bhutan, Nepal and Pakistan) and the facilitation of real-time data transmission using state-of-the-art technology. Establishment of regional and national flood information systems to share real time data and information and increase lead time of flood forecasting.	The HydroSOS-BaNe will build collaboration with ICIMOD for sharing of the data and information from the operational stations and database for the development of the HydroSOS products and EWS. Also, the ICIMOD regional flood information system could be linked or integrated within HydroSOS EWS to receive the real time flood forecasting information (jointly with hydrological processes) to support in the decision-making processes for early warning and early action at the local levels.
South Asia Flash Flood Guidance System (SAFFGS) <a href="https://community.wmo.int/en/south-asia-flash-flood-guidance-system-sasiaffgs">https://community.wmo.int/en/south-asia-flash-flood-guidance-system-sasiaffgs</a> (2018-On-going)	It is part of a global FFGS which currently provides flash flood early warnings to three billion people. Participating countries of SAFFGS are Bhutan, Bangladesh, India, Nepal and Sri Lanka.	FFGS is developed by US-based Hydrologic Research Centre with financial support from USAID and the World Meteorological Organization (WMO). SAFFGS is presently operational in South Asia and HydroSOS-BaNe project will use the flash flood related data and products for development HydroSOS EWS for stakeholders at the local levels.
IUCN BRIDGE GBM project <a href="https://www.iucn.org/our-work/region/asia/our-work/water-and-wetlands/bridge-ganges-brahmaputra-meghna-river-basins-bridge-gbm#:~:text=The%20BRIDGE%20GBM%20project%2C%20facilitated,and%20Governance%20(BRIDGE)%20programme">https://www.iucn.org/our-work/region/asia/our-work/water-and-wetlands/bridge-ganges-brahmaputra-meghna-river-basins-bridge-gbm#:~:text=The%20BRIDGE%20GBM%20project%2C%20facilitated,and%20Governance%20(BRIDGE)%20programme</a> (Phase I-III – July 2016-August 2026)	It aims to build the capacity of a network of Civil Service Organizations (CSOs) in the GBM region to enhance their engagement in transboundary water management issues. The BRIDGE GBM project falls under the umbrella of the global Building River Dialogue and Governance (BRIDGE) programme.	The HydroSOS-BaNe project will check and involve the relevant CSOs from Bangladesh and Nepal to participate in the design and implementation of various proposed activities such as risk maps, community-based flood and drought management, pilot testing of the HydroSOS EWS, local collaboration for developing policies and plan etc. This will ensure existing capacities, lesson learned, and good practices are utilized and enhanced with updated or new tools, products etc. for the management of floods and drought.

Building Resilience to Climate Hazard - Pilot Program for Climate Resilience (PPCR-BRCH) (2013–2018)	The objective is to provide accurate and timely weather and flood forecasts and warnings for climate-vulnerable communities through capacity building, establishment of advanced data collection technologies and enhanced modeling techniques.	The real time data collected from the stations can be used to develop models in data scarce basins, its testing and performance analysis.
Bagmati River Basin Improvement Project <a href="https://www.adb.org/projects/43448-013/main">https://www.adb.org/projects/43448-013/main</a> (December 2015 – October 2018)	Flood forecasting & early warning systems MIKE model was developed. Additional support being provided under Technical Advice to enhance the model performance and an NGO recruitment in process under BRBIP-AF to strengthen the earlier trained communities.	BRBIP project supports the HydroSOS project for evaluation of the baseline study of the flood EWS in Bagmati River, compare the performance of MIKE model Flood Forecasting and Early Warning to HydroSOS EWS. The flood affected communities can be trained for flood and drought adaptation measures.
Priority Based River Basin Flood Risk Management Program (PRBFRMP) <a href="https://prbfrmp.dwri.gov.np/about-us/introduction">https://prbfrmp.dwri.gov.np/about-us/introduction</a> (May 25, 2021 – May 25, 2025)	Output 1. Improved flood protection infrastructure. Output 2. Enhanced flood forecasting and response systems. Support the government and communities in flood-prone areas to improve early flood warning systems through (i) installing about 40 rain gauges and 30 hydro meteorological stations, (ii) developing about 5 flood forecasting and early warning systems (FFEWS), and (iii) improving maintenance of FFEWS. Output 3. Improved flood prevention and preparedness capacity.	The PRBFRMP has focused on improving flood forecasting and early warning systems in 5 Small River Basins: (i) Bakraha.; (ii) Mawa Ratuwa; (iii) Lakhhandei; (iv) Mohana Khutiya and (v) East Rapti. These basins are prone to flooding during monsoon and facing drought during the winter. The HydroSOS thus developed can be tested for flood EWS and drought in data scarce small basins.
CREWS Accelerator project in Nepal supporting the UN EW4All initiative (August 2024- October 2025)	The CREWS project is mainly implemented to identify gaps related to EWS and communication to stakeholders including implementation of priority activities related to EWS such as the Common Alert Protocol, defining thresholds for hydro-meteorological events, community-based approaches, etc.	The HydroSOS-BaNe project will use the developed capacities, tools, and study reports prepared under the CREWS project and will build upon them to improve the early warning system in Nepal
SWEDISH contribution to the EW4All in Bangladesh (April 2024 -December 2025)	The Swedish-funded project is mainly implemented to identify gaps and needs related to EWS and develop capacities of various stakeholders. The project will also allow opportunity to implement priority activities related to EWS such as the Common Alert Protocol, media training, stakeholder consultation on EWS etc.	The HydroSOS-BaNe project will use the developed capacities, tools, and study reports prepared under the CREWS project and will build upon them to improve the early warning system in Bangladesh
Haor Flood Management & Livelihood Improvement Project (HFMLIP) <a href="https://www.jica.go.jp/english/overseas/bangladesh/activities/activity14_01_06.html">https://www.jica.go.jp/english/overseas/bangladesh/activities/activity14_01_06.html</a> (2015–2022)	This integrated flood infrastructure, rural works, agriculture, and fisheries transformation program in Bangladesh's haor (wetland) zone enhanced community resiliency and risk governance.	The HydroSOS-BaNe project will analyse the existing products and infrastructure through the HFMLIP project and assess the integration into the regional EWS platform including use of technical experts trained in the HFMLIP project.

#### H. If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.

The proposed components 1, 2 and 3 include dedicated outputs related to the documentation and dissemination of knowledge generated through the proposed activities. The dissemination of knowledge and good practices will enhance the learning outcomes and could further facilitate the replication of success stories by government agencies and communities facing similar issues in other regions or globally. Different ways are planned to ensure proper coordination and to widen the dissemination of the project outputs to a larger circle of institutions and communities in the two targeted countries of the GBM Basin.

##### Knowledge Management and Experience sharing

- Development of e-learning module(s) for capacity building of key stakeholders. Online learning and training will be an option for those (e.g. representatives, local agencies, etc.) unable to attend events, conferences and workshops. The modules will be accessible to the project stakeholders and to a certain extent to the general public and local organizations even beyond the duration of the project.
- A repository of project's technical reports, voices from the fields, training manuals and guidelines will be developed and made accessible to all. Innovative knowledge products and skills developed through the project will be communicated to respective stakeholders of the targeted countries, across the South-Asian countries and beyond. The medium of communicating these outputs will be the project website, social media channels, national and international workshops/seminars etc. Several experience sharing field visits with the neighboring countries will be organized for the national and local level stakeholders.
- Knowledge management tools and platforms including community of practices (CoP) will be developed for sharing experience and storing project documents, reports etc. It will also be ensured that the methodologies adopted, and human resources trained (from both the agencies and communities) remain a support for other actors and stakeholders in developing floods and drought risks maps, climate change scenarios, community-based initiatives and HydroSOS of their respective countries (and also in regions outside of the GBM basin) through national investments or international funding mechanism.
- As solutions and tools should be co-designed, co-developed and co-implemented in a trans-disciplinary, multi-stakeholder and participatory context, a "Open lab" could be also created in the framework of the proposed HydroSOS-BaNe project. In this "Open lab", citizens, organizations, policymakers and other stakeholders will be involved in a multidisciplinary approach where each participant could contribute with his knowledge and experience about the Floods and Drought Management and/or EWS.

Discussions and exercises in groups, round tables and/or presentations could be implemented to stimulate discussions, as well as to develop and test innovative solutions in real world conditions.

### Outreach to the wider public

- Facebook, LinkedIn and X (formerly known as Twitter) will serve as a wider dissemination strategy to update information, specially targeting the young generation.
- Mass media channels such as radio services, newspapers etc. will also be one effective information dissemination strategies as it is widely used in the GBM countries.
- Leaflets and panels (in the buildings and offices of the partners and on the pilot sites) highlighting the lessons learned and success stories will be shared with stakeholders and in social media for the general public, emphasizing the importance of the project activities and achievements.
- Other dissemination tools such as videos, comic books and infographics (in local languages) will be used to reach a wider non-specialized public, using a non-technical language and, if necessary, local language of the member countries. The comic books and case studies could be turned into videos with a storyboard avoiding scientific terms.
- The APFM Support-Base Partners will be contacted to develop IFM simulation-based decision-support games highlighting the importance of Nonstructural and Nature Base Solutions to improve flood preparedness strategies.

### Technical reports/documents and dissemination of the project results:

- The project activity reports (in English and if possible, in local language) will be disseminated via a web portal, briefs to stakeholders, press releases, national and climate change and disaster risk reduction forums (World Bank hydromet forums, EW4All related workshops etc.), scientific publications (presented during EGU, Stockholm World Water Week, Conference of Parties (CoP) etc., and development of awareness raising tools (digital storytelling, video, success stories etc.)
- The mid-term and post-project assessment activities will be conducted with the government representatives and focal point of communities to determine the lessons learned, impacts and sustainability. The assessment report will be prepared and shared with relevant organisations for any follow-up activities.

### Dissemination of results through external institutions

- Development and humanitarian agencies, NGOs and other actors involved during the implementation of projects could use the flood and drought management products and develop actions in their field of competence (e.g. identification of community-based flood management solutions for populations living in small catchments of the basin).
- Similarly, researchers and other public institutions could work on the base of the actions developed under the HydroSOS-BaNe project, to further engage in the development of adaptation measures (e.g. assessing climate change impacts and solutions in specific locations).
- Through collaboration with the national institutions responsible for technological transfer, private companies working on innovative solutions will be contacted to develop national projects that integrate our identified solutions and disseminate them within their areas of work/sectors.

### Integration of best practices into the WMO and EEs communication and guidance materials

- The success stories and progress of the HydroSOS-BaNe project will be published using the communication media of the implementing and executing entities
- New guidance material in the line of the APFM Tools series <http://www.floodmanagement.info/tools/> could be drafted to promote the results of the HydroSOS-BaNe project, as well as the case studies on the basis of the pilot testing.
- Field visits among different communities and local authorities within countries will be organized to share experiences and learn from each other.

## I. Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation, with particular reference to vulnerable groups, including gender considerations, in compliance with the Environmental and Social Policy of the Adaptation Fund.

**Table 13: Summary of the consultations carried out during the entire project preparation**

Consultations at the regional, national, and community/ vulnerable groups levels	Consultation Dates	Consulted stakeholders/ groups (number of participants disaggregated by gender,	consultation topics and outcomes.	How these outcomes are considered in project design
Regional workshop in India	21-24 November 2021	Government Agencies from the two targeted countries (10 participants out of which 2 were female)	Gather commitment and support for the development of the HydroSOS GBM (initially) with all the countries of GBM basin	Based on the support and commitment, it was agreed to develop the HydroSOS-BaNe project to understand hydrological status and outlook at national and transboundary levels
Community Consultation in Bangladesh and Nepal	18 May 2022 and 20 <sup>th</sup> May 2024	Community representatives including women groups (total participants were 30 out of which 40% were female)	To understand the current issues, gaps and needs for the management of floods and drought events in Bangladesh and Nepal	Based on the discussion, gaps and needs were collected and added as a community-based flood and drought management activities were added under the HydroSOS-BaNe.

National consultation workshop in Bangladesh and Nepal	17 May 2022 and 19 May 2022	Stakeholders from different government agencies and local authorities including communities (Total participants were 100 out of which 50% of them were female)	Present the project pre-concept note of the HydroSOS-BaNe project and identify other on-going or completed projects or initiatives to build synergies or complementarities	Based on the discussion and presentation from various agencies and authorities, completed and on-going projects were shared to avoid duplication of efforts.
Regional workshop in Thailand for preparing the Concept note	7-8 June 2023	Stakeholders from different government agencies (total participants were 12 out of which 2 were female)	Review the concept note including identification of activities and pilot areas for testing the HydroSOS EWS	The discussion between the two countries with the WMO allowed the finalization of the concept note and submission to the Adaptation Fund
Regional workshop on consultation for the HydroSOS project proposal	July 2024	20 representatives from WMO, government representatives from hydrology, meteorology, disaster management, water resources, agriculture, environment, and regional entity ICIMOD participated to review, discuss, and finalize the project proposal	Review and finalize the project proposal including validation of the ESIA and Gender assessment study reports	Based on the discussion and agreement, project proposals were drafted and shared for review with the EEs and other partners. The review and inputs were collected at the national level through a workshop and feedback were incorporated in the final project proposal
EIA, SIA and Gender assessment study in Bangladesh and Nepal	June 2024- August 2024	During the EIA, SIA and Gender related assessment study, more than 500 people were consulted out of which 40 percent of the participants were female.	The study allowed to check for any potential social, environmental and gender specific impacts through the proposed HydroSOS-BaNe project	Based on the study report, relevant information was collected and incorporated into the HydroSOS project proposal especially section II. L
Community consultation in Nepal	October 2024	National agencies and Community representatives of around 100 people (50% of them were female) were consulted following the Kathamndu flood 2024	The consultation meetings allowed us to understand some of the challenges in flood warning and response including coordination and collaboration	Based on the consultation, community-based flood management activities will be refined to including coordination and collaboration at different levels including non-structural measures such as risk maps and impact-based forecasting
National consultation workshop in Nepal	October 2024	50 participants from different agencies, local municipality and community representatives participated in the workshop (22 were female and youth)	Validation of the HydroSOS-BaNe project proposal including feedback on the ESIA report as well as filling up of the user requirements survey	The HydroSOS-BaNe ESIA study report was finalized and added to the proposal. The survey results allowed to understand user needs such as impact-based forecasts and warning services including gender mainstreaming.
National consultation workshop in Bangladesh	October 2024	40 participants from different agencies, local municipality and community representatives participated in the workshop (16 were female and youths)	Validation of the HydroSOS-BaNe project proposal including feedback on the ESIA report as well as filling up of the user requirements survey	The HydroSOS-BaNe ESIA study report was finalized and added to the proposal. The survey results allowed to understand user needs such as impact-based forecasts and warning services including gender mainstreaming.
Virtual consultations with stakeholders of Bangladesh and Nepal	July 2021- May 2025	More than 50 people participated in various virtual consultations to prepare the HydroSOS-BaNe project (30% were female)	Several virtual consultations were carried out to discuss the activities, ESIA studies, list of activities, synergies with other projects or initiatives etc.	The consultation allowed the project team to refine the project concept note and proposal based on the existing capacities, gaps and needs at all levels

The above-mentioned consultation workshops or meetings reports, or field visits reports are shared under Annex 2 and below is the summary of the consultative process carried out during the HydroSOS-BaNe project development.

A preliminary joint national assessment and consultation studies were conducted in the targeted countries with the NMHSs and other concerned authorities in 2020, aiming to better understand their current capabilities, needs and priorities for effective management of water resources and climate extremes in the GBM countries. Even though there were travel restrictions in these countries due to the covid-19 pandemic, the project team organized [vulnerable community visits](#) (with local level associations, women, youths, minor and vulnerable groups, at various sites of the basin to understand current needs and examine benefits of the project outputs and services), [regional virtual consultation meeting](#), [two day hybrid regional workshop](#) and [national consultation workshops](#) with the National stakeholders to present and finalize the project activities and collect missing and additional information such as [user requirements to investigate and discuss benefits and functionalities \(types of information, forms of warning etc.\)](#), selection and finalization of the sites for the pilot testing of the HydroSOS-GBM products, inputs on social and environmental risks, role and responsibilities of the national agencies, etc. In the next phase of project development, several face-to-face consultations are planned with the national and regional entities including conducting of social and environmental impact assessments. The community-related consultation also provided the opportunity to get feedback from more than 100 individuals consisting of marginalized, vulnerable and women groups (check the minutes of meeting of the [vulnerable community visits](#)) about the issues and needs related to the existing early warning system and the future proposed HydroSOS early warning system envisaged by WMO and national partners. The proposed functionalities (type of information, forms of warning, dissemination channels, etc.) and benefits of the HydroSOS products and service were discussed with the participants so that their views, suggestions will be acknowledged and incorporated in the final design and development of the web-based early warning system.

**Total consulted citizens (Individuals of vulnerable, marginalized and minority communities including women) through focus-group discussions and semi-structure interviews until submission of the project proposal: more than 1000; Number of female participants: approximately 40% are from Government or community associations and NGO's (including women groups).**

Additionally, the consulted members suggested further requirements for enhanced floods and drought management at the local level including better sourcing; access and delivery of the early warning information to every section of the communities (potentially have last-mile connectivity), timely support to vulnerable individuals, rain-gauge and river-gauge instruments for local forecasting, loudspeaker (megaphone) and radio for early warning information dissemination.

Some of the main outcomes of the citizen consultations are summarized as below:

- Riverine floods in the downstream agriculture areas are generating negative impacts. There is a need to develop local capacities to manage the agricultural production between the floods to ensure food security and adequate income. The requirement is timely information on the climate change events its variabilities and information on adaptation measures.
- Flood events are occurring faster than before and the conventional is no longer effective, endangering lives of people and their livelihoods.
- A new mode of early warning communication system is required for increasing self-help capabilities, preparedness and response measures. Internet connectivity is available with mobile phones and similarly local radio network can be useful for communication.
- Access routes to the schools, offices, jobs centers are inundated during the flood events, reducing the capacities of people to have regular and economical activities.
- Gender sensitive approach of the proposed project will provide capacity development and sustainable functioning of women groups and associations in the countries
- Any activity related to water and soil conservation will be welcome in order to improve agricultural productivity
- The communities are ready to test any new technologies or tools for better adaptation to the climate change and variability.

Their suggestions are incorporated for a community-based flood and drought management approach and involvement is given due importance during the pilot testing and further included as part of activities under the components 1 and 2.

The project will indirectly benefit hundreds of thousands of people living in the GBM countries through the proposed strategy of community-based flood and drought management and by enabling local-level climate change adaptation measures. In addition, private sectors such as agriculture, aquaculture, and hydropower will be important stakeholders that will benefit from the project outcomes. The studies for hazard and vulnerability mapping proposed under Component 1 of this project will help screen potential risks from a local community perspective (as per the Adaptation Fund's Environmental and Social Policy (ESP) and Gender Policy (GP)) that may arise during implementation. From an environmental viewpoint, the IUCN Red List of Ecosystems Categories and Criteria will be studied to understand better the status of ecosystems, applicable at local, national, and global levels.

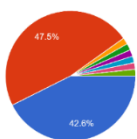
In the concept note development phase, [a regional face to face workshop](#) with the WMO, representatives of NMHSs, and environmental agencies of Bangladesh and Nepal was organized during early June 2023 mainly to review and finalize the HydroSOS concept note – agree on the list of activities, updated institutional arrangements, selection of potential pilot sites for the testing of the HydroSOS EWS, decided on the way forward including review of Terms of Reference for the Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) study.

In the Project proposal development phase, WMO organized a [regional stakeholder consultation workshop](#) where 20 representatives from WMO, government representatives from hydrology, meteorology, disaster management, water resources, agriculture, environment, and regional entity ICIMOD participated to review, discuss, and finalize the project proposal.

The workshop provided an opportunity to agree on the tentative budget plan for the agreed list of project activities, validate the Environmental and Social Impact Assessment (ESIA) study report (including the Environmental and Social Risk Management Plan(ESMP)), finalization of pilot sites for community-based activities and HydroSOS-early warning system, synergies with other initiatives and projects especially on EW4All initiative in the two countries, institutional arrangements, regional coordination with ICIMOD etc. thereby building a solid platform for the successful development and later implementation of the project from regional to national to community levels.

Are you interested in receiving information regarding alerts issued in the neighbouring GBM countries? If yes in which form? \*

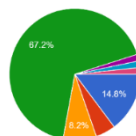
61 responses



- Visualisation (not editable) of other countries warnings through the Hydro...
- Receiving a general bulletin, issued by an institution, covering the whole GB...
- Satellite-derived products
- Annual Summary Report only
- Visualization maps would be useful too
- Receiving both of above which contai...
- Nepal country boundary and Tibetan r...
- email and webpages

Bulletin should be consistent in time, providing alert information on fixed boundaries (so called "alert-zones"). These areas should be defined accor... would you define the alert zones? On the base of:

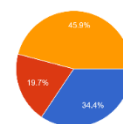
61 responses



- Hydrographic sub-basin
- Administrative level 1 (e.g. regions)
- Administrative level 2 (e.g. districts)
- A combination of sub-basins and administrative levels
- Sub districts
- Potential affected areas, Ward level
- agroecological zone levels

How frequent would you like to receive/issue a warning?

61 responses



- Daily, even if no relevant events are observed or forecasted
- with a fixed frequency, higher than daily (e.g. weekly, monthly)
- Only when relevant events are observed or forecasted (no standard daily routine)

In early October 2024, WMO jointly with DHM Nepal and ICIMOD visited the flood-affected site in the Kathmandu Valley (Bagmati river at the end of September 2024 during which approximately 200 people lost their lives and more than 1000 were injured) to meet and

discuss with the community the issues encountered during the flooding situation including ways for improvement in the future. The community members informed that the warning from the DHM was provided but it was not an impact-based warning (impact to which area and possible exposure) due to which they did not have a clear knowledge of whether their houses, and roads nearby will be flooded or not. Also, one of the issues for potential impact on property and social institutions was mainly due to the construction of houses in flood-vulnerable areas or plains. There is a need to have knowledge and awareness sessions with communities and local authorities to avoid similar impacts in possible future events. DHM Nepal will be strengthened with the development of risk maps, and an impact-based forecasting system through the HydroSOS-BaNe project. Also, the regional and national workshops in the two targeted countries provided an opportunity to identify user requirements (61 responses) (available also under Annex 2) were received from 20 plus national and regional agencies of Bangladesh and Nepal) through a survey especially to understand the user's (different agencies and institutions) views and requirements from the HydroSOS EWS to improve or strengthen their day-to-day work responsibility and fulfill their mandate on socio-economical services to the population. For the development of an effective web-based HydroSOS EWS, this survey aims to investigate and discuss the benefits and functionalities (types of information, forms of warning, etc.) of the HydroSOS EWS service. The views and suggestions received (as shown in the charts and pie-charts below) will be essential for creating a system that can support and easily integrate into national operating services, assimilating available models and data and support in saving lives, improving livelihoods, and protecting the environment. During the project inception and implementation phases, the project partners will continue conduct out face-to-face consultations with local, national, and regional entities as well as organize community-level consultations at various sites across the basin, including meetings with local associations, women, youth, and vulnerable or minority groups, at various sites of the basin to examine additional needs and support from the project outputs and services and also get commitment and support following the local planning and decision making process.

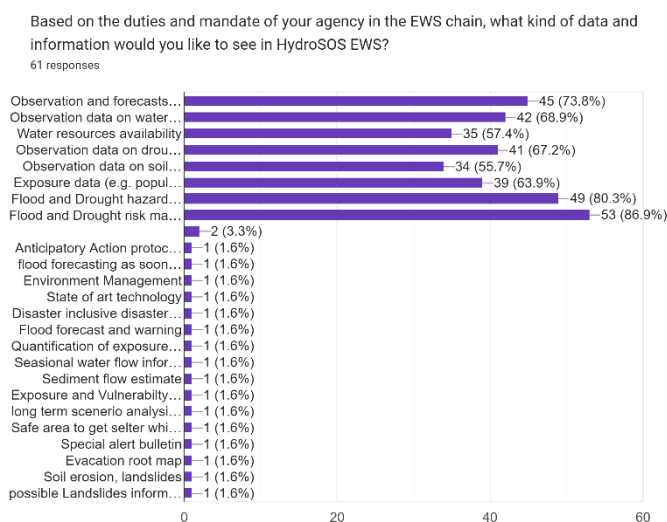


Figure 20: Survey results from the stakeholders of Bangladesh and Nepal on needs related to the EWS

## J. Provide justification for funding requested, focusing on the full cost of adaptation reasoning.

Climate change has been severely impacting the GBM countries with regular and large-scale floods and drought events especially impacting lives, properties, livelihoods and ecosystems. The governments of the two riparian countries have been developing and implementing various strategies and action plans to enhance preparedness and resilience to these extreme events, with technical and financial support from ministries, international development partners, and agencies. The Adaptation Fund will support the HydroSOS-BaNe project to expand on, and complement existing projects, in accordance with the development priorities of the countries in the urban and rural areas. The yearly flood and drought events have reduced community capabilities and their investments in socio-economic growth, such as houses, assets, livestock, food security etc. The proposed project will provide benefits to both communities and agencies and opportunities to work in a coordinated and collaborated way achieving long-term adaptation measures for Flood and Drought management. The need for concrete adaptation measures to extreme events is an important requirement for the GBM riparian countries according to the initial consultation by WMO with the stakeholders of the GBM Basin. The HydroSOS-BaNe project includes the following components for developing adaptation measures and capacities:

### Component 1: Risk-based preparedness and adaptation to climate variabilities, water use stresses and environmental uncertainties

#### Baseline situation (without any support from the Adaptation Fund)

In general, 80 percent of the land and natural resources in the GBM region and countries are prone to floods and drought events. The hydrological and meteorological characteristics of the GBM Basin and the projected climate change impacts on socio-economic vulnerabilities have not been adequately addressed and incorporated into development planning and other land use practices over the years. The government agencies of the countries also lack adequate information about the increasing risks related to extreme climate events, leading to gaps in plannings and decision-making for effective flood and drought management. As a result, private and community infrastructure, as well as natural resources are continuously exposed to climate variability, resulting in damage and degradation of adaptive capacities.

#### Impact due to the proposed project (with the support of Adaptation Fund)

The HydroSOS-BaNe project plans detailed assessments of vulnerabilities, capacities and exposure to floods and drought events in the targeted GBM countries and the development of the related risk maps for present and future predicted climate scenarios. Moreover, the project will support the establishment of risk management framework and capacities of the stakeholders (especially policymakers, disaster managers etc.) to take risk informed decision-making for floods and drought events. In addition, the project will bridge the gap in adaptation measures to integrate future scenarios (economic, urban, climate, environment, etc.) into current knowledge (risk mapping, hydrometeorological features) and practices to improve the future planning and design of concrete adaptation measures or interventions. For this purpose, synergies will be created with country level projects or programmes on climate change adaptation to develop integrated flood and drought management strategies and approaches at local, national and regional levels.

## **Component 2: Strengthening water resources management through access to hydro-meteorological information and augment regional /national capacity to monitor and assess Hydro-Meteorological hazards**

### **Baseline situation (without any support from the Adaptation Fund)**

Presently there is no systematic measurement practices appropriate for water resources and floods and drought monitoring and forecasting over a large part in the GBM Basin. The available instruments such as radars, sensors and gauges provide information but there is no timely availability of flood and drought forecasting and warning information to the communities prone to these hazards. The existing flood and drought preparedness and response measures at local, national and regional level are ineffective, due to the lack of technical capabilities of various national agencies working on floods and drought management including coordination at local, national and regional levels. Without AF support, the situation will not change, or even deteriorate, and the population in the GBM riparian countries will continue to remain highly exposed to extreme weather, water and climate events and face consequent damages. Additionally, local actors and flood prone communities lack knowledge and tools for mainstreaming gender and developing natural and nature-based solutions for flood management, however they have useful traditional solutions and adhoc experiences which need to be captured and integrated in new flood and drought management strategies.

### **Impact due to the proposed project (with the support of Adaptation Fund)**

The HydroSOS-BaNe project will support the development and implementation of HydroSOS, an end-to-end Early Warning System for both floods and droughts providing tailored hydrometeorological information services for the agencies, communities and the general public. The AF support will be used to strengthen data collection, transfer and management from the existing instruments available on the GBM and from external sources (national systems for monitoring hazards, global platforms (NOAA, NASA, JAXA, Joint Research Commission), satellite-based data etc.): this is a mandatory step towards a robust and appropriate network for forecasting and early warning information. The GIS-based early warning information system will be developed for the beneficiaries at all levels made of simple color-coded graphs and risks zoning maps, as proposed in the HydroSOS EWS prototype. The EWS will improve the stakeholder's capacities to take decisions and prepare for reducing impacts and if required, implement alternative practices. These systems will be more effective through improved coordination among the hydrometeorological services, the other concerned departments at local and national levels and the communities prone to floods and drought. The capacity development activities, such as Gender mainstreaming for End-to-End Early Warning Systems for Floods and Integrated Flood and Drought Management through natural and nature-based solutions will foster pro-active approaches to account for climate change variability and its associated impacts.

## **Component 3: Water and climate resilient regional cooperation arrangements together with national and regional stakeholders, and community involvement**

### **Baseline situation (without any support from the Adaptation Fund)**

Although the GBM countries have recognized the need to adapt to climate change variability, the existing governance structure at the transboundary and national levels does not provide coordination and collaboration in water and natural resources management. The policies, guidelines or plans for collecting and sharing data and information related to hydro-meteorological conditions are not yet enforced to improve preparedness for extreme events. The shortage of policies plans and strategies at local, national and transboundary level for the management of short- to medium-term disaster risks exposes the GBM countries population to unsustainable socio-economic conditions.

### **Impact due to the proposed project (with the support of Adaptation Fund)**

The AF support will facilitate the development of an enabling environment among local, national and international actors and stakeholders. Systematic coordination between the riparian countries will facilitate the achievement of the common objective of developing concrete risk reduction and climate adaptation measures. Additionally, the project will develop capacities of beneficiaries to review or develop new policy frameworks to integrate climate risks into land, water, environment, livelihood with development plans and practices at local, national, and transboundary levels of the GBM Basin.

## **K. Describe how the sustainability of the project outcomes has been taken into account when designing the project.**

Project sustainability will be achieved through close collaboration and capacity building of stakeholders at all levels i.e. local, national and transboundary ensuring their long-term commitments for climate change adaptation activities and services developed through the project. The provision of sufficient human and financial resources will be ensured for the production, operation and maintenance of the new knowledge products and tools developed such as HydroSOS EWS which will be free, tailored and open source for use by the stakeholders

Sustainability strategies for the three outcomes of the HydroSOS-BaNe components:

**Table 14: Sustainability strategy for each Component related results**

<b>Outcomes under Component 1</b>	<b>Outcomes under Component 2</b>	<b>Outcomes under Component 3</b>
Long term sustainability will be developed through participatory stakeholder engagement and knowledge exchange between local communities and government agencies. By showing, how and when, the risks of floods and drought	Long term maintenance of the operational tools and methodologies for the activities under component 1 and 2 is important for sustainability and scaling up the results within the countries or to the neighboring countries/region. The NMHSs of the two countries (executing agencies of the project) will be highly involved in the development and operation of the HydroSOS Early Warning System for Flood and Drought during the course of the project and after its	The involvement of regional entities such as Nepal-Bangladesh Joint Expert Committee (JEC) on Harnessing of Water Resources and Mitigating Flood and Flood Damages, RIMES, ICIMOD

<p>events will change over short and longer periods in the GBM basin, the stakeholders will be more aware of the value of vulnerability, capacity, exposure and risks assessment activities, the alteration of the risk factors and their impact on their daily life. The Bangladesh and Nepal NMHSs will provide support (staff and resources) to complete activities proposed under the HydroSOS-BaNe project, such as development of flood and drought risks maps. The periodic assessment of the risk related information will need to be developed by the national agencies to update the associated flood and drought risk maps of their communities in order to be prepared for climate-related extreme events. Local communities will be encouraged and incentivized to continue implementing and maintaining the various activities and deliver concrete adaptation outputs under Component 1.</p>	<p>completion. <a href="#">NMHSs commitment</a> is already taken to ensure that the HydroSOS Early Warning System (HydroSOS EWS) will be integrated into the day-to-day operations of their observatory or forecasting center. Doing so will ensure the long-term sustainability and operation of the software platform and related databases. Following the project's completion, the NMHSs will ensure the on-going maintenance and updating of the system regardless of the availability of other sources of funding (<b>The NMHSs have already provided support letters to ensure the long-term transfer of information from the national databases to continue operations of the HydroSOS EWS coordination unit (letters are provided under Annex 6).</b> It is anticipated that NMHSs will work with the regional technical partners (ICIMOD or RIMES) that could be hosting the HydroSOS EWS operational center or have it on the cloud with web-based access and will also cover maintenance/enhancement costs through other on-going and future projects or initiatives that will be linked to the early warning system developed under the HydroSOS-BaNe project. WMO will build on lasting collaborations with the NMHSs, as the pilot project HKH-HYCOS, which was endorsed 10 years ago. The HydroSOS and Early Warning Systems (EWS) for Floods and Drought, as envisaged in the demo prototype (Annex 1), will be developed and used by the actors of national agencies, especially the representatives of NMHSs, water resources agencies, the Country Water Partnerships and national disaster management authorities. The long-term allocation of duties and responsibilities for the Flood forecasting and EWS will be taken up by the regional entity ICIMOD in collaboration with the NMHSs, with support at governmental level in the Ministries. Additional institutions involvement will be discussed during the capacity development activities of component 2.</p> <p>WMO has officially agreed with ICIMOD (agreement letter provided under Annex 6) to have their support in the design and implementation of HydroSOS-BaNe project mainly at the regional level to organize and facilitate the regional level activities such as on the development of risk profile and HydroSOS EWS through organizations of workshops, sharing of experiences, regional dialogue with countries etc. b) to agree on the development and implementation of regional strategies for risk management and prevention approaches through HydroSOS EWS c) to ensure data harmonization and are shared from national agencies to continue the operation of the HydroSOS system and d) under component 3, support in the review, update or development of transboundary policies, plans and guidelines on managing floods and drought events in the changing climate. A MoU has been signed between WMO and ICIMOD where a specific task on regional support from ICIMOD is requested for projects in the Ganga Brahmaputra Meghna region such as HydroSOS-BaNe and upcoming WMO Hind Kush Himalaya Hydrological Cycle and Observation System (HKH HYCOS-II) phase 2 project (under preliminary discussion).</p>	<p>together with NMHSs is extremely valuable to ensure the implementation of component 3, and specifically the sustainability and long-term effects of data sharing policies, sustainable development plans and practices and code of conducts at the local, national and transboundary scales. JRC will extend its operational role and maintain the project results in the longer term, therefore contributing to the design and implementation of the GBM basin Strategic Action Programme (SAP). Major institutions in charge of coordination and civil protection activities from national to local level will be integrated while detailing, and later implementing, the project components:</p>
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National Ministries, Financial institutions such as Asian Development Bank, World Bank and International organizations will be invited to follow the project implementation and success stories, as an example, ADB and WB will be approached for scaling up the project to other countries in South Asia and South-East Asia. The National Ministry of environment and forest in Bangladesh and Nepal, as financing instrument of national environment and climate adaptation projects to implement nature-based solutions identified through the project. National Meteorological and Hydrological agencies will be able to contribute to the expansion of the HydroSOS EWS to other countries in South Asia.

#### **L. Provide an overview of the environmental and social impacts and risks identified as being relevant to the project.**

All project activities have been screened for any environmental and social risks according to the 15 principles outlined in the AF's Environmental, Social and Gender Policies. As noted in the following table, all principles are applicable to all sites in the targeted countries, GBM region in general. Specific principles were analyzed on a case-by-case basis during various field visits and in view of the exposure to one or both floods and drought hazards. It is also noted that when a specific risk is applicable and triggered, this could lead to other risks as well. Based on initial consultations and assessment with the Country stakeholders, highly impacting risks are not part of the proposed project on the GBM region as all the measures follow the principles of integrated water resources management and contribute to increased preparedness measures for climate change events such as floods and drought.

However, some of the proposed project activities such as the development of risk maps can alert the national agencies and communities about the locations possibly at-risk for flood or drought events. The national agencies might then consider moving or relocating people, or people on their own could decide to move to safer places in urban or rural areas. This can be considered as primary indirect risks. Moreover, secondary or dependent risks such as economic marginalization, fight for water, land and food resources and social and cultural conflicts with the existing people at the new location might become a challenge to the relocating families. The national agencies or people should be made aware of this kind of risk and their impacts. The proposed project will raise awareness or knowledge for such risks and potential safeguard measures with prior and informed consent of the stakeholder. With the information available at this stage, the project is expected to fall into medium risk category B because interventions such as information through risk maps and EWS will strengthen national agencies and communities' capacities to prepare and adapt to the climate change.

**Table 15: Based on information available and screening on the Environmental, Social and Gender policy/principles of the Adaptation Fund during the EIA and SIA studies carried out during the proposal development phase and associated ESMP and Gender Action Plan are available under Annex 3 and 4.**

AF's Environmental and Social Policy	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
Compliance with the law		<p>Risks: Low Impact: Low</p> <p>During the EIA and SIA process, stakeholders stated that the project will ensure that national laws and guidelines for the GBM river basin will be followed during implementation of the adaptation measures and capacity development activities. No prior environmental or construction permissions are needed as no physical or structural constructions are planned. However, for the installation or rehabilitation of the hydrological and meteorological stations or warning systems at local levels, screening of laws or acts will be carried out to adhere to the requirements necessary for the safe installation and protection of infrastructure. If required international laws on data sharing protocols among different countries will be consulted and agreed upon with the stakeholders.</p> <p>Risk Mitigation and management measures: Before the implementation of any activity, concept note, or Terms of Reference (ToR) will be shared with the stakeholders to check if there is any noncompliance with any laws, acts and policies. Following the agreement with the national and regional stakeholders, implementation of the activities will be carried out. If any potential risks or impacts are identified during the implementation phase, risk prevention or management strategies will be executed as described in the ESMP provided in Annex 3. In case if there is need of installation or rehabilitation of Meteorological and Hydrological stations on forest area in Nepal, then according to law, Brief environment study will be necessary which will be done as per EPR 2020.</p>
Access and Equity		<p>Risks: Low Impact: Low</p> <p>The project design is developed to allow representatives of all groups in every capacity development training/workshop at local level. However, the project has capacity development activities to which only a small percentage of the communities will be able to participate. The project will ensure that these representatives of communities will further disseminate the information to wider groups. The selected participants will be expected to disseminate the training knowledge to other members of communities or organizations so that everyone will have fair and equitable access to all project benefits. The selection of participants/beneficiaries will also be made in consultation with local practices, traditions and access to social facilities.</p> <p>Risk Mitigation and management measures: Before the implementation of any activity, concept notes or Terms of Reference (ToR) will be shared with the stakeholders to identify all the relevant participants to join the capacity development and other activities. Women and other vulnerable groups will be encouraged to participate in various activities and decision-making processes. For any recruitment, application from women candidates will be encouraged and preferred. Pilot testing in each country will allow opportunities to involve all stakeholders including vulnerable groups to access tools, develop knowledge and skills and strengthen their resilience to climate change events. In case of any potential risks and impacts are identified during implementation phase, risk prevention or management strategies will be executed as presented under the ESMP provided under Annex 3.</p>
Marginalized and Vulnerable groups		<p>Risks: Low Impact: Low</p> <p>The project will contribute to reducing existing inequalities in access to EWS for floods and droughts, particularly those affecting marginalized or vulnerable groups who depend on agriculture or reside in urban areas. The EWS system for floods and drought will be available through technological sources but the accessibility to the warning services will be provided to all vulnerable populations. During the pilot testing, the members of communities (including marginalized and vulnerable groups) and local agencies will be provided with adequate knowledge and explanations about the systems to use it for their own benefits.</p> <p>Community-based flood and drought management activities, including gender mainstreaming initiatives, will encourage the active participation of marginalized and vulnerable groups and their appropriation of projects benefits.</p> <p>It was described by the FGD participants during public consultation that the vulnerable and marginalized groups will have insufficient knowledge and access to technological devices such as mobile phones or lack of good cellular connectivity. This risk will be overcome by developing tools, technology and strategy adhering to local knowledge and capacities.</p> <p>Risk Mitigation and management measures: During the design of the EWS, several consultations are planned with the stakeholders to understand their needs and capacities. The project team will ensure all stakeholders are consulted during the planning of every activity being implemented. To avoid the exclusion of marginalized and vulnerable communities in warning communications, local radio channels and traditional practices will be implemented to reach these groups especially women, girls, elderly,</p>

AF's Environmental and Social Policy	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
		physically challenged individuals. In case of any potential risks and impacts are identified during implementation phase, risks prevention or management strategies will be executed as presented under the ESMP provided under Annex 3.
Human Rights		<p>Risks: Low Impact: Low</p> <p>The issue was discussed with the stakeholders and all agreed that there is no activity under this project that could violate the human rights of the community members in the targeted areas. The project will promote basic human rights, extend support to get access to basic needs and information. The IE and EEs partners affirm the fundamental human rights of all people. In compliance with laws, regulations, and acts, the project ensures that its operations and all associated activities fully adhere to established human rights principles. The project will ensure that a description of the legal and regular frameworks will be required for all interventions to ensure compliance is met throughout the implementation of the project. However, there is a possibility of participation of only specific groups of people in the capacity development activities due to the prior involvement or consultation, authoritative personality and access to the location, availability and language barriers.</p> <p>Risk Mitigation and Management measures Before implementation of any activity, concept note, or Terms of Reference (ToR) will be shared with the stakeholders to check for the potential participants from all groups to join the project activities. As much as possible, participation of the stakeholders from all the groups will be prioritized in the project activities. Sharing of experiences and knowledge from the beneficiaries to other stakeholders will be prioritized.</p>
Gender Equality and Women's Empowerment		<p>Risks: Low Impact: Low</p> <p>The importance of women's empowerment, leadership and participation was emphasized by the stakeholders during EIA and SIA study. It was recommended by the stakeholders in the KII and FGD that women's participation in disaster preparedness and decision-making is often limited due to cultural and social norms especially in Bangladesh. Therefore, planning participatory activities will ensure that women and representatives of women's associations are sufficiently well represented. The proposed project will promote gender equity and women's empowerment through capacity building training under different planned activities. The proposed project will improve the gender equity and women empowerment through the WMO developed tool: Training Manual for mainstreaming gender in end-to-end Early Warning system for Flood forecasting and integrated Flood Management through a participatory design approach. This will help in increasing the participation of women, girls and other vulnerable groups in Flood and Drought management activities as well as decision making processes. Also, the activities related to risk maps and early warning system will be developed in an inclusive and participatory manner ensuring data collection for vulnerabilities are dis-aggregated by sex. The warning information are tailored to the needs of the population especially considering women, children, elderly, youths etc. Women representatives will be actively involved in the design, organization and implementation of activities especially in training workshops, meetings, update or review of policies and plans etc. so that they are empowered with knowledge, skills and tools for preparedness and resilience. The trained women will play active role in strengthening the community preparedness and decision-making processes.</p> <p>Risk Mitigation and management measures: The project will implement the gender responsiveness action plan provided under Annex 4 to support any gender-specific needs and roles in the project implementation. If there are any risks identified, the ESMP will be utilized for gender responsiveness action to mitigate or minimize the risks.</p>
Core Labour Rights		<p>Risks: Very Low Impact: Low</p> <p>During the discussion of the labor rights issue in the EIA and SIA process the stakeholders stated that the project will be implemented and managed in compliance with the country's designated labor laws. Child labor will be forbidden both within the organization and other project partners. However, during hiring of national and local experts for development of risk maps, EWS and other measures, preference might be given to male candidates due to limited scientific knowledge and experience (related to Hydrology and Meteorology) in female candidates in the two countries.</p> <p>Risk Mitigation and management measures: In ToRs, preference will be provided to female candidates with similar background and experiences and where possible, candidates with closely linked background to hydrology and meteorology will be hired and trained where necessary.</p> <p>In case of any potential risks and impact identified during the implementation phase, risk mitigation or management strategies will be executed as presented under the ESMP provided under Annex 3.</p>
Indigenous Peoples		<p>Risks: Low Impact: Low</p> <p>During the EIA and SIA process, stakeholders stated that the indigenous population in the region would be consulted and involved in the design and implementation of project activities. The traditional knowledge of</p>

AF's Environmental and Social Policy	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
		<p>indigenous people on flood and drought will be valuable. The FGD and KII mentioned that the strategies include participation, training, equitable benefit-sharing mechanisms, will ensure compliance with indigenous peoples' issues.</p> <p>In case of any potential risks and impact identified during the planning and implementation phase, a built-in safeguard approach for risks prevention or management strategies will be executed as presented under the ESMP provided under Annex 3.</p>
Involuntary Resettlement		<p>Risks: Low Impact: Medium</p> <p>There are no activities proposed in the project which will create direct involuntary resettlement of communities. However, the risk of displacement of the population after the mapping of floods and drought risk areas could be possible as some areas could be classified as high risk for the loss of lives. On the basis of evidence-based and scientific information, the agencies will propose new prevention plans to prohibit future settlement in the high-risk areas.</p> <p>Risks Mitigation and management measures: Resettlement plan has to be formulated by the governmental agency if any resettlement occurs. A safeguard approach will be established to minimize the negative effects of involuntary resettlements. Affected populations will be informed of their rights, aware of grievance mechanisms, consulted on options, and offered resettlement alternatives or fair compensation. In case any potential risks or impacts are identified during the implementation phase, risk prevention or management strategies will be applied as outlined in the ESMP provided under Annex 3.</p>
Protection of the Natural Habitats	X	<p>Risks: N/A Impact: No impact anticipated</p> <p>It was mentioned by the KII and FGD participants of the stakeholder's consultation that there are no potential direct risks to the protection of ecosystems and its natural habitats and biological diversity through the project activities. Existing and new policies, plans, and activities to protect natural habitats will be reviewed with stakeholders to ensure legal protection of critical habitats. In case of any potential risks and impacts are identified during the implementation phase, risks prevention or management strategies will be executed as presented under the ESMP provided under Annex 3.</p>
Conservation and Biological Diversity	X	<p>Risks: N/A Impact: No impact anticipated</p> <p>During consultations conducted for the preparation of the EIA and SIA studies, the various stakeholders confirmed that there are no direct risks to biodiversity conservation, as the project does not involve any intervention in natural resources or the introduction of new species. However, it may lead to changes in agricultural and irrigation practices, as well as pesticide use, to improve production. The project will encourage biodiversity conservation activities, such as reforestation and nature-based solutions, through assessments at pilot sites with national agencies. It will also promote capacity building and peer learning to enhance the efficient management of natural resources, including aquatic species, animals, and forests. In case of any potential risks and impacts are identified during the implementation phase, risk prevention or management strategies will be executed as presented under the ESMP provided under Annex 3.</p>
Climate Change	X	<p>Risks: N/A Impact: No impact anticipated</p> <p>During the EIA and SIA process the findings of the climate change issue described by the stakeholders that there is no activity of this project that may cause the emission of greenhouse gases and no activities of deforestation, thus having no impact on climate change. Additionally, the project will enhance local flood and drought resilience and improve governance, policies, and plans for climate change adaptation at both national and regional levels.</p> <p>Furthermore, the project does not only increase the flood and drought adaptation capacity and resilience of the local population but also contributes to develop better governance structures, policies and plans at both national and regional levels for climate change adaptation. Community resilience will be enhanced through the awareness building activities and additional supports in agricultural and income generating activities for the poor community.</p> <p>In case of any potential risks and impacts are identified during implementation phase, risk prevention or management strategies will be executed as presented under the ESMP provided under Annex 3.</p>
Pollution Prevention and Resource Efficiency	X	<p>Risks: N/A Impact: No impact anticipated</p> <p>During stakeholder consultations conducted as part of the EIA and SIA processes, the findings indicated that no project interventions are expected to result in water, air, or soil pollution. The project will strengthen technical and organizational capacities for the rational use of water at both national and transboundary levels, supported by clear guidelines, policies, and action plans.</p> <p>In case any potential risks or impacts are identified during the implementation phase, risk prevention or management strategies will be executed as outlined in the Environmental and Social Management Plan (ESMP) provided in Annex 3.</p>

AF's Environmental and Social Policy	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
Public Health	X	<p>Risks: N/A Impact: No impact anticipated</p> <p>According to the EIA and SIA findings it is mentioned by all concerned stakeholders that the project activities should not negatively impact public health. Instead, they will help prevent natural disasters and improve access to health and sanitation facilities. However, population displacement due to disasters (during the implementation) could lead to epidemics in displacement camps due to poor hygiene or sanitation conditions. This situation is not directly linked to the implementation of project activities.</p> <p>Risks Mitigation and management measures: A safeguard approach will be implemented through knowledge-sharing and awareness activities within community-based flood management initiatives to promote proper hygiene and sanitation practices. The project will identify flood-prone communities and raise awareness on health and safety measures during capacity-building activities. It will also regularly inform and educate communities about diseases associated with floodwater, such as malaria, typhoid fever, amoebiasis, and cholera.</p> <p>Affected populations will be informed of their rights, aware of grievance mechanisms and possible support. In case of any potential risks and impacts are identified during implementation phase, risk prevention or management strategies will be executed as presented under the ESMP provided under Annex 3.</p>
Physical and Cultural Heritage	X	<p>Risks: N/A Impact: No impact anticipated</p> <p>In the stakeholder consultation during the EIA and SIA process it was confirmed that the project does not have any activity related to affecting physical and cultural heritage sites. The participatory design and mapping approach will involve local communities and authorities to identify areas of physical and cultural significance and ensure that community-based flood and drought management activities will not negatively impact them. In case any potential risks or impacts are identified during the implementation phase, risk prevention or management strategies will be applied as presented under the ESMP provided under Annex 3.</p>
Lands and Soil Conservation	X	<p>Risks: N/A Impact: No impact anticipated</p> <p>The project is not expected to lead to any negative impacts to land and soil conservation. The project will promote soil and land resource conservation, focusing on natural and environmentally friendly solutions as part of the community-based activities. The project also aims to enhance agricultural practices and strengthen the capacity of farmers and technicians to better cope with climate change events and build resilience through socio-economic activities. In case any potential risks and impacts are identified during the implementation phase, risk prevention or management strategies will be executed as presented under the ESMP provided under Annex 3.</p>

### PART III: IMPLEMENTATION ARRANGEMENTS

#### A. Describe the arrangements for project management at the regional and national level, including coordination arrangements within countries and among them. Describe how the potential to partner with national institutions, and when possible, national implementing entities (NIEs), has been considered, and included in the management arrangements.

As per the below Institutional Arrangement shown in figure 21, WMO as the implementing entity will provide overall project management including financial oversight, monitoring, and reporting of project activities. Its international experience and presence through the WMO Regional Office for Asia position it ideally for coordinating with national authorities, especially NMHSs (other executing entities of the project) to manage day-to-day implementation in accordance with the project's approved work plan, budget, Monitoring and Evaluation activities including monitoring of the Environmental and Social Management Plan (ESMP) and Gender Action Plan (GAP). The Technical Support Unit (TSU) of the WMO Associated Programme on Flood Management (APFM) and the Integrated Drought Management Programme (IDMP) supported by a network of Support Base Partners comprising of NMHSs, academia or research centers, private engineering companies and international organizations will design and develop technical solutions with the executing partners, and they will have close links with the beneficiaries in the field. The IE (WMO) jointly with other EEs (Bangladesh Meteorological Department (BMD), Bangladesh Water Development Board (BWDB), Department of Hydrology and Meteorology (DHM) of Nepal) will select the APFM and IDMP technical implementation partners (to support the national agencies in implementing various activities) ensuring the following 1) Organizations have experience of working in the project countries or region 2) Organizations have relevant technical expertise in the various areas of project activities ensuring solutions and tools are provided that are free and open source following participatory approach which will be sustainable and without leading to social, environmental and gender related risks. Considering the existing limited capacities of the NMHSs (other executing partners) and mandate of working and supported by the WMO, it is important that WMO, as one of the executing entities, provides technical execution support to the NMHSs so as to develop affordable, tailored and sustainable solutions following WMO standards, guidelines and practices in the project countries. This has been agreed with the other Executing Entities

and National Designated Authorities (support letter provided under Annex 7) to take the execution role at the national level especially with the procurement of goods and services (as a United Nations specialized agency has VAT exemption), expertise and availability of technical tools and products etc. which will be instrumental in the execution of the project activities at regional and national levels. Other WMO teams (members of Standing Committee on Hydrology, Disaster Risk reduction and Agriculture) will provide support in reviewing the project results and programmes. The HydroSOS team comprising of WMO hydrological coordination staff, UK Centre for Ecology & Hydrology (UK-CEH) and other contributing partners will be instrumental in providing technical guidance and implementation support to the national agencies. Other on-going initiatives of the WMO Climate Risk and Early warning system (CREWS), Flash Flood Guidance System, HydroHub programme, Dynamic Water Assessment Tool (DWAT) will contribute to the development of tools, products and services delivery to the decision makers and expand the results of the project to the neighboring regions.

At the regional level, ICIMOD will lead the regional cooperation and coordination of the activities (as regional technical partner) jointly working with the WMO, NMHSs, and other partners of the two countries (support letter is provided under Annex 6) especially with the organization of the regional consultation workshops, coordinating regional dialogue, supporting data harmonization across countries, fostering capacity-building on hydrological monitoring and forecasting, update and develop regional policies, plans etc. The involvement of the ICIMOD will allow the project to link and use the existing activities/information in the two countries building synergies and complementarities of other on-going projects with the HydroSOS-BaNe project.

At the National level, Executing entities (Bangladesh Meteorological Department (BMD), Bangladesh Water Development Board (BWDB), Department of Hydrology and Meteorology (DHM) of Nepal as NMHSs of two riparian countries of GBM will lead the technical implementation and coordination of the project activities jointly with NIPs, facilitate communication between local communities, government agencies, and implementing partners, and ensure alignment with legal, environmental, and social safeguards. For executing the project activities, the National Hydrological Services (NHSs) of each country (through a project technical manager) will be the National focal point and will implement the technical activities at the National and local levels through local agencies, NGOs and private partners forming a network of technical support group. NHSs will be in-charge of engaging and disseminating the project results towards the related Ministries in charge of Water Resources, Environment, Hydropower, Irrigation, Agriculture and Civil Defense, and to the regional organizations such as International Centre for Integrated Mountain Development (ICIMOD), Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES) etc. working at the basin level. The National agencies of the GBM countries will come up with regional intergovernmental associations or authorities such as recently formed Nepal-Bangladesh Joint Expert Committee (JEC) on Harnessing of Water Resources and Mitigating Flood and Flood Damages (panel of meteorologists, hydrologists, and disaster risk management professionals from the operational organizations or services) to define the regional implementation plan and strategies for the long-term sustainability of the project outputs and outcomes. A project steering/advisory committee will be established with membership of National Designated Authority, agencies specialized in hydrology, meteorology, water resources, disaster management and of regional entities which will provide review and strategic guidance to the implementation of the project activities as well as support in promoting the project results in the region or outside the GBM countries. The proposed project will take into consideration the existing information, resources and infrastructures available in the country and try to support the needs of the GBM countries to develop HydroSOS system as well as support in developing concrete adaptation measures for climate change resilience at local and national levels. For each of the two countries, the contributing national and local partners related support (knowledge and skills) will be gathered and used for developing tools and products. They will play an important role in the implementation of the activities and working with the local stakeholders and beneficiaries. The list of the national agencies responsible for each activity will be refined before the inception meeting. A detailed project implementation arrangement is described in the figure 21 above showing how implementing, executing and other national entities coordinate and report to each other. ICIMOD will provide regional coordination support to the two countries and support in sharing of knowledge and experiences, development or updating of the policies, guidelines and plans.

At the national level, the Bangladesh Meteorological Department (BMD) and Bangladesh Water Development Board (BWDB) and Nepal's Department of Hydrology and Meteorology (DHM) act as the primary executing agencies implementing with and reporting to WMO on project progress and to their respective government ministries for oversight and alignment with national priorities. The PMU formed by the Implementing and Executing partners will coordinate and report to the IE's (WMO) project executive available for overall supervision. PMU will work with the NIP such as disaster management authorities, agriculture and irrigation department, ministry of planning and information department etc., for their participation and engagement to the project implementation. Technical partners of APFM and IDMP programmes—who will contribute to technical implementation of activities and will report to the PMU and Project Executive.

During the implementation of the HydroSOS-BaNe project, regional coordination between Bangladesh and Nepal is facilitated primarily through the ICIMOD (jointly working with the PMU), which serves as a bridge between national agencies and ensures consistency in applying tools and methodologies across both countries as well as carry out regional approach in terms of policies, plans and guidelines for future sustainability and investments from the governments and financial institutions. This coordination is operationalized through joint planning workshops, technical consultations, and regular cross-country meetings involving the BMD, BWDB, Nepal's DHM and other agencies at national and local levels including communities. These engagements are designed to harmonize data collection methods, modeling and impact-based forecasting approaches, and hydrological outlook tools, particularly in the context of shared GBM river basins. Collaborative training sessions and peer-learning exchanges further strengthen institutional capacity and promote regional alignment. Additionally, WMO supports the establishment of shared protocols for data exchange and early warning information to foster interoperability and enhance transboundary water risk management. This regional mechanism ensures that both countries benefit from collective technical advancements, avoid duplication of efforts, and contribute jointly to the broader goals of HydroSOS in South Asia. Regular regional coordination meetings, joint training workshops, and knowledge exchange sessions will support in strengthening regional collaboration and capacity building for regional joint monitoring of climate change events. For coordination at all levels, a regional working strategy group (RWSG with at least 50% of the members are female) (mainly to check the implementation progress of the activities, engage in policy dialogues and knowledge exchange, facilitate cooperation, and develop advocacy and joint strategies for dissemination at global platforms) and National Working Group (NWG with at least 50% of the members are female) (supported by the appointed National Project coordinator of the Executing Entities) will be established in each country and will be responsible for the overall execution of the project and facilitating coordination with various stakeholders including IE and EEs of the project. The IE and EEs will provide overall guidance, assessing implementation progress with the intended objective and technical support during the implementation of the project activities. This RWSG and NWG will meet regularly (at least monthly or quarterly) and will coordinate annual work planning, governance agreements, track project progress (technical and financial), and facilitate implementation. It also ensures compliance with all AF requirements, including Environmental and Social Safeguards. A Project Management Unit (PMU) will be established with the WMO, regional and national executing entities staff working directly with the regional working strategy group (RWSG) and National Working groups (formed with the representatives of various agencies) to ensure the planning and timely execution of the project activities. The overall implementation arrangements for the HydroSOS BaNe project are available under Figure 21.

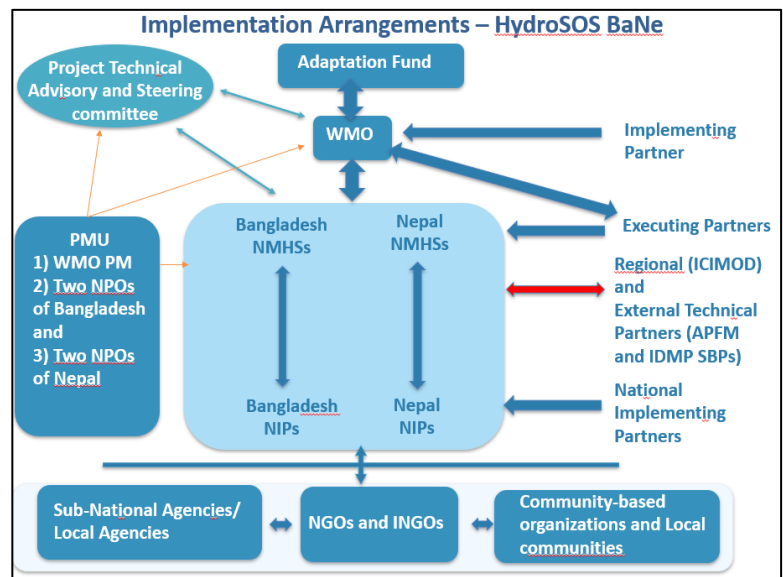


Figure 21: Institutional arrangements of the HydroSOS-BaNe project including reporting lines

The overall implementation arrangements for the HydroSOS BaNe project are available under Figure 21.

## Roles and Responsibilities of the implementing, and executing partners, national and regional technical coordination partners, and external technical partners

### Roles and Responsibility of the Implementing and Executing Partner (WMO)

- Responsible for the overall management of the project, including all financial, monitoring, and reporting responsibilities
- Funds transfer to the executing entities
- Implementation of various activities through the support of regional, national, and international technical partners ensuring solutions and services provided are affordable, tailored, and sustainable.
- Procurement of goods and services (including consultants)
- Follow Adaptation Fund environment and social policies in the planning and implementation of the project activities
- Lead the development and submission of the annual project progress report (PPR) and share it with the adaptation fund for review and endorsement
- Conduct independent mid-term and final evaluation

### Roles and responsibilities of the executing partner (NMHSs of the two countries)

- The executing entities are fully accountable for the management, operation, and use of funds for activities at the national and local levels
- Executing entities will carry out specific tasks related to the preparation and execution of adaptation activities
- Support Implementing entity in various activities: M&E reporting and procurement services (including consultancy) through local NGOs and partners based on the needs

- Support and develop technical and financial reports of the activities and PPR reports and submit it to the Implementing Partner

**The responsibilities and duties of the Internal and External partners shall be the following:**

- Provide technical design support and develop solutions requested by the Implementing and Executing partners
- Help implement activities at the Local, National and Regional level
- Ensure linkage with the completed, on-going, and upcoming projects or initiatives

The PMU will be comprised of the following focal points:

1. WMO Project Manager
2. Two Project officer/consultants – Bangladesh
3. Two Project Support Officers – Nepal

The PMU will be headed by the HydroSOS Project Executive of the WMO (representative of the Implementing Partner) who will have the overall responsibility of the project and will have regular consultations with the representative of the Executive Partners.

Note: For Nepal, the two project support officers (hired temporarily for the duration of the project) will support and work under the overall guidance and supervision of the Project Implementation Unit (PIU) of DHM which is headed by Gazette Second Class officials and consists of financial and administrative officers, etc.

For Bangladesh- the two project consultants (hired temporarily for the duration of the project) will support and work under the overall guidance and supervision of the Project Implementation Unit (PIU) of BMD and BWDB which is co-headed by the focal points of the BMD and BWDB and consists of financial and administrative officers, etc.

**Responsibilities of the PMU (as described under below diagram)**

- Day to day planning and implementing the project activities;
- Building synergies and complementarities with other completed and on-going initiatives
- Develop project work plans and associated budgetary provisions;
- Drafting of regular progress reports;
- Ensuring joint coordination, sharing of work plans, quality assurance of activities and outputs;
- Jointly promote and ensure visibility of the project, through issuance of communication products as may be appropriate;
- To identify and resolve potential situations of conflict or challenges that may negatively impact on the project implementation.

The PMU, RWSG and NWG will play a critical role in project governance structure incorporating gender-responsive elements throughout the project implementation. The PMU will support to have women member as the chair of the RWSG and NWG ensuring the views of all the beneficiaries are clearly considered and addressed. During the planning meeting of the activities at regional, national and local levels, PMU, RWSG and NWG will invite one each male and female representatives of national/local agencies and organizations to participate in the decision-making processes. The PMU will be meeting with RSWG and NWG regularly to ensure gender sensitive approaches are applied during the planning and implementation of the project. During the Inception phase of the project, a mandatory virtual training courses on Gender Equality and Unconscious Bias for all PMU, RWSG and NWG representatives will be conducted to ensure adequate knowledge is delivered for gender responsive approaches into planning, execution, and evaluation processes. In case of hiring of any internal or external experts for supporting or participating in the implementation of any activities (for example: risk maps development through internal experts), the Terms of Reference (ToR) will encourage female candidates to apply for the position and preference will be given to female candidates in case the experience, skills etc. matches to the other male candidates. The project is committed to ensure sensitive or inclusive approaches being applied at each step and levels of the implementation. The project's implementation structure promotes inclusive and active participation from all stakeholders to ensure benefits of the project reaches to all without any discrimination.

**B. Describe the measures for financial and project / programme risk management.**

Financial and project risk measures have been assessed during the different preparation phases of the project. The potential risks identified are:

**Table 16: Measures for Financial and project risk management**

Type of risk and how it affects the project	Risk impact on the project goal (Low, medium, high)	Probability of occurrence (low, medium, high)	Mitigation measure(s)
<b>Social:</b> Even though detailed needs assessments and consultations with stakeholders have been conducted since 2019, the support of the stakeholders can differ in the targeted countries. This will result in differential	Medium	Low	- During the preparation phase of the project, all relevant stakeholders (government, agencies, departments and communities) will be/are clearly identified, so that they fully share the vision and goal of the project and are aware of their

levels of acceptance or support and eventually could slow down the inception phase of the project.			contribution to the project, hence fostering ownership and sustainability over the process. - MoU or agreements will be signed with the participating stakeholders. - Roles and responsibilities of the implementing/executing agencies and other technical agencies/organizations will be defined in the initial stages of the project so that all the activities are completed in a coordinated way.
<b>Institutional:</b> Administrative barriers hinder the sharing of hydro-meteorological, social and topographic data. This results in difficulties in implementing components 1 and 2.	Medium	Medium	The implementing (WMO) and executing (NMHSs) entities will ensure the required data and information are made available and national level tools and products are shared. Furthermore, WMO is mandated for regional exchange of data and information on hydrology, meteorology and climatology and can request the enforcement of the agreements.
<b>Institutional:</b> Component 2 of the project is too technical and not adapted to specific areas or countries. This might result in low commitment and interest from stakeholders	Medium	Low	The project activities will be first reviewed by experts from WMO and NMHSs and eventually with the support of NIPs, local decision-makers and participants from community, the available resources, expectations and suggestions will be collected. The feedback and suggestions from the participants will be integrated into the planning and implementation of the activities.
<b>Political:</b> Restructuring in the government work structure may cause possible shifts of responsible persons at local and national levels to a different location. This can result in delays and loss of support.	Low	Medium	Alternative people from the departments will be involved in most of the activities so that implementation of project activities will not be hampered at any time.
<b>Financial:</b> ▪ Inadequacy of the financial management system: procurement system, financial availability, monitoring, reporting and auditing system, etc. ▪ Availability of project resources ▪ This will result in slowing down the project activities	Low	Low	During implementation, project and financial monitoring/reviews will be conducted to ensure efficient management of project resources.
<b>Institutional:</b> ▪ Lack of skills or human resources availability ▪ Adequacy between existing and required experience and skills ▪ This results in slowing down the project activities	Medium	Low	-The project benefits from the deployment of professionals/staff by the implementing and executing agencies (WMO/NMHSs) who are selected by a panel of experts. Their ToRs are developed based on the project needs and in collaboration with the hosting institutions. - National support is obtained at the level of the governmental agencies to ensure sufficient human resources
<b>Institutional:</b> ▪ Lack of available tools and templates for developing reports and progress report ▪ Delays of reporting by the partners ▪ This results in delays in the reporting process and access to funding	Low	Medium	Appropriate tools/templates and reporting structures and procedures will be established by WMO to ensure proper documentation and reporting so that donor agencies and steering committee receive timely reports.
<b>Political:</b> Interference from the local/national political parties This will result in delaying the project activities	Low	Low	The project will adhere to the goals, laws, and policies of the respective GBM countries. Whenever and wherever required, permission of national consensus of the countries will be taken or shown.
<b>Social: Gender neutral approach</b> Techniques and technological tools developed are not accepted by all groups of the communities. This decreases the gender inclusive or equality compliances	Low	Medium	The project includes gender-sensitive approach in all activities. Wherever required non-technological or traditional methods will be adopted to reach and get participation from every group of the communities.
<b>Environmental:</b> Considering Bangladesh and Nepal are prone to yearly flooding and drought situations, it could lead to delay in the implementation of activities such as community-based activities, capacity development etc. due to the unavailability of stakeholders	Medium	Medium	Seasonal weather outlooks will be monitored to plan the implementation of the activities including agriculture seasons so as to ensure adequate participation of the stakeholders.

WMO Monitoring Evaluation and Risk Prevention (MERP) team and its technical advisory group (Standing Committee of Hydrology and working groups) will provide support to the project team and executing agency in conducting regular risk monitoring and evaluation of the project activities, and the results will be tracked and reported in WMO's internal monitoring system. In addition, a dedicated

Monitoring and Evaluation (M&E) team will be established, to ensure that essential budget and resources are allocated to implement the M&E framework, including mid-term and terminal evaluations.

**C. Describe the measures for environmental and social risk management, in line with the Environmental and Social Policy of the Adaptation Fund.**

During the final preparation (proposal development) phase, an Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) study (in line with the Environmental, Social, and Gender Policies of the Adaptation Fund) were conducted for screening the proposed project activities against the 15 principles of the Environmental, Social and Gender Policy of the Adaptation Fund. The EIA and SIA studies of the project were undertaken by two ESIA national experts, taking into account the existing laws, legislation or practices in place of Bangladesh and Nepal countries, along with the transboundary laws and acts on Environment and Social including Gender aspects.

Both the national experts/ consultants having more than 10 years of experience were hired to conduct environmental and Social Impact assessments in the targeted regions of Bangladesh and Nepal. The methodology of the study includes field visits to the vulnerable locations of Bangladesh and Nepal, semi-structured interviews or focus-group discussions with the agencies (national meteorological and hydrological services (NMHSs), disaster management, environment, water resources, and irrigation, civil authorities, etc.) and citizens (representatives of communities impacted by floods and droughts, marginalized and vulnerable communities, community-based organizations, associations or self-help groups, etc.). Based on the EIA and SIA study, A detailed report on the Environment and Social Impact Assessment (ESIA) and the associated Environment and Social Management plan (ESMP) and Gender Action Plan were developed and submitted during the project proposal as available under Annex 3 and 4.

The EIA and SIA studies carried out in the two countries highlighted the minimal direct risks associated with the implementation of the proposed activities at the regional, national, and local levels. The ESRMP is available under Annex 3 and Gender Assessment and Gender Action Plan for the HydroSOS-BaNe project are provided under Annex 4.

**Table 17: Screening of the AF ESP and Gender policy and any impacts on social and environmental related aspects**

Screening questions	Further Compliance is required	Potential Risk, impact	Impact			
			Environmental		Social	
			Positive	Negative	Positive	Negative
<b>AF Principle 1: Compliance with the law</b>						
Compliance with the national laws, acts and policies.	Yes	Risk: Low Impact: Low	Ensure compliance with all relevant national laws, acts, and policies to facilitate smooth and timely project implementation. This will involve following the protocols, and procedures of national and local governments in both countries. No prior environmental or construction permits are required as no physical or structural constructions are planned. If required international laws on data sharing protocol among different countries will be consulted and agreed upon with the stakeholders. Before implementing the activities, a concept note or ToR will be shared with stakeholders to verify compliance with relevant laws, acts, and policies Following the agreement, implementation of the activities will be carried out	There are no negative impacts foreseen	Safeguard the rights, livelihoods, and well-being of communities at risk.	
<b>AF Principle 2: Access and equity</b>						
Access all community members to the early warning messages.	Yes	Risks: Low Impact: Low	The project design is developed to allow representatives of all groups in every capacity development training/workshop at local levels. However, some capacity-development activities will involve only a small percentage of community members. The project will ensure that representatives of all vulnerable groups participate in all trainings and workshops and that they share the knowledge	Considering the limited budget, it might be possible that some individuals are not able to participate. The project will request trained individuals of the community to share knowledge with others	Ensured peoples participation, cohesion and collective approaches to protect lives and livelihoods.	

Screening questions	Further Compliance is required	Potential Risk, impact	Impact			
			Environmental		Social	
			Positive	Negative	Positive	Negative
			gained with their respective communities.			
<b>AF Principle 3: Marginalized and vulnerable groups</b>						
Including the marginalized and vulnerable groups, in the planning and implementation.	Yes	Risks: Low Impact: Low	This project will enhance community preparedness, reduce losses, and protect biodiversity. The project will contribute to the reduction of existing inequalities for EWS for floods and droughts, particularly those affecting marginalized or vulnerable groups dependent on agriculture or living in rural/urban areas. The EWS system for floods and droughts will be available through technological sources but the accessibility to the warning services will be provided to all vulnerable populations. During the pilot testing, the members of communities (including marginalized and vulnerable groups) and local agencies will be provided with adequate knowledge and explanations about the systems to use it for their own benefits. Community-based flood and drought management activities including gender mainstreaming will support the participation of marginalized and vulnerable groups and their appropriation of projects benefits.	Difficulty may arise as the groups will have insufficient knowledge and access to technological devices and methodology. The project team will ensure all stakeholders are consulted during the planning of every activity implemented. To avoid the exclusion of marginalized and vulnerable communities in warning communications, local radio channels and traditional practices will be implemented to reach these groups especially women, girls, elderly, physically challenged individuals. In case of any potential risks and impacts are identified during implementation phase, risk prevention or management strategies will be executed as presented under the ESMP provided under Annex 3.	The real needs about livelihoods, resiliency will be focused and develop as per plan accordingly.	
<b>AF Principle 4: Human rights</b>						
Potential human rights issues associated with the project.	Yes	Risks: Low Impact: Low	This project is not going to take any direct activity to impact in the human right issues. But human rights issues will be addressed by the activities done by the project during disasters. All human right laws (freedom of speech, access to information etc.) will be applied during implementation		Basic human rights including access to food, shelter and information will be facilitated during the impending period.	
<b>AF Principle 5: Gender equality and women empowerment</b>						
Impact of women's participation in decision-making processes	Yes	Risks: Low Impact: Low	Gender equity, leadership, women's empowerment, and ownership will be strengthened through various activities, including gender mainstreaming in flood management and	In Bangladesh, participation of women might be limited due to restricted cultural norms. As much as	Ensure the identification and addressing of real issues affecting women to help reduce losses and	Women's participation in disaster preparedness and decision-making is often

Screening questions	Further Compliance is required	Potential Risk, impact	Impact			
			Environmental		Social	
			Positive	Negative	Positive	Negative
			community-based initiatives. This will help in increasing the participation of women, girls and other vulnerable groups in Flood and Drought management activities as well as indecision making processes. In addition, the activities related to risk mapping and early warning system will be developed in an inclusive and participatory manner ensuring data collection for vulnerabilities are disaggregated by sex. This will contribute to social and ecosystem protection.	possible women staff will be employed in the project to engage women of the communities in decision-making and implementation of the activities. The project will implement the gender responsiveness action plan provided under Annex 4 to support any gender-specific needs and roles in the project implementation. If there are any risks identified, the ESMP will be utilized for gender responsiveness action to mitigate or minimize the risks.	promote social harmony and peace.	limited due to cultural and social norms, as well as limited access to knowledge about technology and a reluctance to engage with it. The project will implement the gender responsiveness action plan provided under Annex 4 to support any gender-specific needs and roles in the project implementation. If there are any risks identified, the ESMP will be utilized for gender responsiveness action to mitigate or minimize the risks.
<b>AF Principle 6: Core Labour Rights</b>						
<b>Support to the Core Labour Rights</b>	Yes	Risks: Very Low Impact: Low	During the discussion of the labour rights issue in the EIA and SIA process the stakeholders stated that the project will be implemented and managed in compliance with the country's designated labor laws. Child labor will be forbidden both within the organization and other project partners.			
<b>AF Principle 7: Indigenous Peoples</b>						
Indigenous people are supported and engaged in the project	Yes	Risks: Low Impact: Low	During the EIA and SIA process, stakeholders stated that the indigenous population in the region would be consulted and involved in the design and implementation of project activities. The FGD and KII mentioned that the strategies include participation, training, equitable benefit-sharing mechanisms, will ensure compliance with indigenous peoples' issues. In case of any potential risks and impact identified during the planning and implementation phase, a built-in safeguard approach for risks prevention or management strategies will be executed as presented under the ESMP		The traditional knowledge of indigenous people on flood and drought will be valuable to link the climate adaptation measures with the livelihood-based disaster risk management using traditional knowledge and practices. Protection of the rights, traditional knowledge, social inclusion, cultural preservation for the indigenous people will help in enhancing resilience.	

Screening questions	Further Compliance is required	Potential Risk, impact	Impact			
			Environmental		Social	
			Positive	Negative	Positive	Negative
<b>AF Principle 8: Involuntary Resettlement</b>						
Involuntary Resettlement	Yes	Risks: Low Impact: Medium	There are no activities proposed in the project which will create direct involuntary resettlement of communities.	However, the risks of displacement of the population after the mapping of floods and drought risk areas could be possible as some areas could be classified as high risk for the loss of lives. On the basis of evidence-based and scientific information, the agencies will propose new prevention plan to prohibit future settlement in the high-risk areas.	Communities will have clear knowledge on risk areas and can support in better identification of socio-economic development activities	In-direct: Minor for loss of land and income generation activities.
<b>AF Principle 9: Protection of the natural habitats</b>						
Natural habitats that could be affected by the project.		Risks: N/A Impact: No impact anticipated	There is no project activity that will affect natural habitats. The project will focus on awareness building to enhance conservation efforts.		Strengthened community engagement in habitat protection and restoration efforts.	
<b>AF Principle 10: Conservation and Biological Diversity</b>						
Reduce the threats to biodiversity in the ecosystem of the project.		Risks: N/A Impact: No impact anticipated	The various stakeholders briefed during the consultation for the preparation of EIA and SIA study stated that there are no direct risks to biodiversity conservation, as the project does not involve any intervention in natural resources or the introduction of new species. However, it may lead to changes in agricultural and irrigation practices, as well as pesticide use, to improve production. The indirect impact of the devastation will be reduced by early warning messages, which will help mitigate threats to biodiversity in the project's ecosystem. The project will encourage biodiversity conservation activities, such as reforestation and nature-based solutions, through assessments at pilot sites with national agencies. It will also promote capacity building and peer learning to enhance the efficient management of natural resources, including aquatic species, animals, and forests. Risk maps will provide information on protected and wetland areas that could be preserved for managing flooding and drought events.		Supporting livelihoods, food, and culture and enhance the resilience of the community.	
<b>AF Principle 11: Climate Change</b>						

Screening questions	Further Compliance is required	Potential Risk, impact	Impact			
			Environmental		Social	
			Positive	Negative	Positive	Negative
Potential climate change impacts during its implementation period		Risks: N/A Impact: No impact anticipated	During the EIA and SIA process the findings of the climate change issue described by the stakeholders that there is no activity of this project that may cause the emission of greenhouse gases and also no activities of deforestation, thus having no impact on climate change. The project does not have activities that harm the environment; instead, it focuses on enhancing the community's adaptation capacity and resilience by providing information, implementing adaptative measures (raising of houses, agriculture practices, alternative livelihoods etc.) and trainings		Build capacity of local communities on climate change adaptation that enhances productivity and income generation. Project activities will be supportive for the preservation of Cultural identity and history.	
<b>AF Principle 12: Pollution Prevention and Resource Efficiency</b>						
Pollution prevention and efficient use of resources		Risks: N/A Impact: No impact anticipated	Project doesn't have any activity to pollute any areas. However, pollution management and mitigation measures will be increased through awareness. The project will strengthen technical and organizational capacities for the rational use of water at both national and transboundary levels with clear guidelines, policies, and action plans.		Enhanced community health and safety as pollution risks are identified and mitigated.	
<b>AF Principle 13: Public Health</b>						
Public health issues that could arise from the project activities and have environmental and social impact?			The project does not involve any health hazardous or public health-related activities. Disease incidence will be reduced through health awareness activities. However, population displacement due to disasters (during the implementation) could lead to epidemics due to poor hygiene or sanitation in the temporary camps or settlement areas.		Building awareness of best practices for health-related safety delivering messages on health and hygiene issues during disasters.	
<b>AF Principle 14: Physical and Cultural Heritage</b>						
Minimize the impact on cultural and physical heritage sites due to flood or drought.		Risks: N/A Impact: No impact anticipated	The project does not include any activities that could affect cultural or physical heritage; instead, it will raise community awareness about the importance of preserving heritage. The participatory design and mapping approach will engage local communities and authorities in identifying areas of physical and cultural significance to ensure that community-based flood and drought management activities do not negatively impact them.		Project activities will be supportive for the preservation of Cultural identity and history.	
<b>AF Principle 15: Land and soil conservation</b>						

Screening questions	Further Compliance is required	Potential Risk, impact	Impact			
			Environmental		Social	
			Positive	Negative	Positive	Negative
Conserve land and soil in the face of flood or drought conditions associated with the project.		Risks: N/A Impact: No impact anticipated	Implementing land and soil conservation practices can significantly enhance resilience to flood and drought conditions, reducing soil erosion and improving water retention. The project aims to enhance agricultural practices and strengthen the capacity of farmers and technicians to cope with climate change events and build resilience through socio-economic activities.		These conservation practices stabilize farm production during extreme weather, ensuring food security and livelihoods.	
<b>Additional Screening Questions for Cost-Effectiveness Measures</b>						
Cost-effectiveness of the Early warning systems, community-based activities, and risk maps/		Risks: N/A Impact: No impact anticipated	Methods like early warning systems and risk maps typically involve considering and using existing natural features and systems (like rivers or weather patterns) more effectively.		Engaging communities empowers them to understand and effectively respond to climate risks, promoting resilience and adaptive capacity.	

**The positive impacts through the project activities implementation:**

- Build Institutional capacity to take appropriate measures to reduce the vulnerability of the community in the targeted project areas
- Ensure accurate impact-based forecasting and dissemination of early warning messages
- Lead time will be available for forecasting and warning communication
- Develop effective coordination among the concerned departments and agencies.
- Develop various tools and techniques for risk mitigation through forecasting and early warning
- Disaster Management Committee will play an active role in early warning systems
- Agencies, municipalities, and communities in the targeted areas will be able to receive timely early warning messages and advisories to support their livelihoods.
- Development of the community's capacity to take the right time to prepare for disasters.
- Reduce the risk of marginalized and vulnerable people through their involvement in the project.
- Women's participation in the project to empower their participation and reduce their vulnerability
- Help in managing water resources more effectively and also maintaining and restoring ecological balance by providing early warning
- It will empower communities with timely information and tools to prepare for and respond to floods or droughts, reducing potential loss of life and livelihoods
- Raises awareness about hydrological risks, fostering a culture of preparedness and adaptive behavior among the population

**The potential indirect negative impacts:**

- Trust gap will be created if not maintain the accuracy of the forecasting messages.
- May be failed mid- and long-term forecasting accurately due to limited availability of real-time data from ground stations
- Inaccurate forecasts may cause unacceptance by the community.
- Any delays in forecasting may reduce its effectiveness for the community. Coordination gaps among departments and agencies may slow down implementation. The Inactive Disaster Management Committee makes barriers to reaching remotely located vulnerable groups.
- Resettlement may happen after risk mapping which may create the loss of livelihoods of the community of the identified risk areas.
- Over-reliance on technology for forecasting could lead to neglect of traditional knowledge and practices related to water management

Overall, while the Hydrological Status and Outlook System offer significant benefits in terms of environmental sustainability and community resilience, careful implementation and consideration of local contexts are essential to mitigating potential negative impacts. The potential low-medium indirect risks identified for the 15 environmental and social principles of the Fund in relation to the project activities have been described in section L, Part II, and concrete mitigation actions have been proposed for each risk category.

Activities under components 1 and 2 are low to medium risks and will not require any further environmental screening or assessment. Component 3 activities will be implemented through consultative processes with agencies, community and representative groups to improve flood and drought management at the national and transboundary levels and will increase community resilience, promoting gender equity and utilizing traditional knowledge as a basis for planning the adaptation measures.

A cross-analysis of the actions planned by the project and the field investigations at the level of the national portions of the GBM Basin regions in the 2 countries, made it possible to identify the positive and negative impacts of the integrated flood and drought management project. These environmental and social impacts are classified as positive or negative. The analysis of these impacts will allow to propose mitigation, compensation, or improvement measures according to the impact categories.

A dedicated Grievance mechanism has been developed (available under Annex 3 related to ESIA report and ESMP) for the beneficiaries of the project to address or report any complaints or discrimination directly to the Implementing entity (WMO), Executing Entities (BMD, BWDB, DHM and WMO) and funding agency (Adaptation fund) through available forms or email addresses as provided below. The stakeholders will be informed about the Grievance Mechanism during several consultations carried out in the project implementation phase. Several means (using emails, social media or through posts) will be made available for reporting the concerns they may have or find during the activity design and implementation phase. Under Annex 3: ESIA report and ESMP, the Diagram 1 represents the identification of risks and issues on social, and environment related principles of the Adaptation Fund and Diagram 2 reflects the procedure of risks mitigation or management from local level to national level to WMO/Adaptation Fund.

#### **Grievance Redresses Process**

At the Implementing Agency level, the grievance mechanism will be regularly monitored for the complaints from the beneficiaries or stakeholders who will share their feedback directly through the post mail, phone, fax or email using the details below.

#### **Bangladesh Meteorological Department**

E-24, Agargaon, Dhaka-1207, Bangladesh Phone: +88 02 41025730, 41025731, 41025705

Fax: +88 02 41025726, 41025727, 41025728; Email: info@bmd.gov.bd ; swc@bmd.gov.bd

#### **Bangladesh Water Development Board**

16 Merul Badda, Dhaka 1215, Bangladesh; Email(s): shamal1967@yahoo.com, se.pffc@bwdb.gov.bd

Contact person: Dr. Shamal Chandra Das; Phone: +8801759693375

#### **Department of Hydrology and Meteorology in Nepal**

Government of Nepal, Ministry of Energy, Water Resources and Irrigation, Babarmahal, Kathmandu, Nepal

+977- 1- 5319052, 5358224, 5358276, 5319007, dg@dhm.gov.np

#### **World Meteorological Organization**

Associated Programme on Flood Management/Integrated Drought Management Programme 7bis, avenue de la Paix Case Postale No. 2300; CH-1211 Geneva 2, Switzerland Tel.: + 41 (0) 22730 81 11 and email:

floodmanagement@wmo.int or filling the WMO contact page: <https://wmo.int/contact-us>

#### **Adaptation Fund**

Issues or Grievances can be directly reported to the Adaptation Fund using the below form or contact address

<https://www.adaptation-fund.org/contact/>

Adaptation Fund Postal Address

Adaptation Fund Board Secretariat; Mail stop: N 7-700; 1818 H Street NW; Washington DC 20433; USA;

+1.202.473.0701 (v); +1.202.522.3240 (f)

### **D. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan.**

Monitoring and Evaluation (M&E) assess the overall progress and impact of the project activities through the Baseline, Key Performance Indicators (KPI) and Targets to be achieved. These indicators will be monitored regularly to identify achievements and gaps, thereby supporting the development of additional strategies to achieve the targets.

#### **Monitoring and evaluation arrangements for the project activities**

A monitoring and evaluation system will be developed to support the implementation and decision-making teams in designing, implementing, and conducting post implementation follow up of the project activities. The overall (short, medium, and long-term) impact of the planned activities will also be assessed using appropriate resources, methodologies, tools, etc. The monitoring and evaluation arrangements will have a gender-disaggregated system of data collection (baseline and target to be achieved as established in the context of the results framework of the project) and reporting for each of the project outcomes and components.

**Table 18 The M&E arrangements will be structured and organized at various levels of institutional set-up**

Institutional level	Responsible actors	Support to the M&E framework
Local or Community level M&E activities	National Project Manager, Local Staff of Agencies (NMHS, Water Resources, Disaster Management), NGOs National External M&E expert	Collect Baseline, KPI, target to be achieved, means of verification for the activities implemented at the local level Updated checklists with the local project progress reports (LPPR) through semi-structure interviews or focus-group discussions, field visits consultation, Technical activity report

National level Monitoring and evaluation activities	Regional and National Project Manager, NMHSs staff, International M&E expert	Collect Baseline, KPI, target to be achieved, means of verification for the activities implemented at the National level Updated checklists with the National project progress reports (NPPR) through semi-structure interviews or focus-group discussions, field visits consultation, Technical activity report
Regional/Transboundary level Monitoring and evaluation activities	Regional and National Project Manager, NMHSs staff, International M&E expert	Collect Baseline, KPI, target to be achieved, means of verification for the activities implemented at the National level Updated checklists with the regional project progress reports (RPPR) through semi-structure interviews or focus-group discussions, field visits consultation, Technical activity report

### Monitoring and evaluation arrangement for the identified environmental and social risks

The M&E Plan of the HydroSOS-BaNe project will explicitly incorporate the monitoring and management of identified environmental and social risks to ensure sustainable and inclusive project implementation. This will be achieved by integrating specific indicators and milestones related to environmental protection, social inclusion, and safeguard compliance into the project's results framework.

Monitoring and evaluation of Environmental and social risks will be carried out through the following steps:

Step 1: The plan will include regular tracking of any development of social and environmental risks by PMU and EEs,

Step 2: Following any detection or in case of identification of any risks (through stakeholder engagement activities, and the effectiveness of the grievance redress mechanism), initial cause analysis will be carried out to detect the root cause

Step 3: Formation of the Grievance Redress Committee (GRC) at the Project Execution Unit level and assessment of the identified risks and possible mitigation and management measures will be identified and implemented. Data will be disaggregated where relevant (e.g., by gender or vulnerability status) to assess equitable impact, and adaptive management will be applied to address emerging risks.

Step 4: An Issue Closure Report will be developed by the GRC and PMU and shared with the Adaptation Fund and Project Steering/Advisory Committee for Record Tracking as well as lesson learned repository will be developed for guidance and support in case of any future environmental and social risks emerging from the HydroSOS Project implementation.

Through these measures, the M&E Plan will provide a structured approach to ensuring that environmental and social considerations are embedded in project implementation, reporting, and learning processes.

### Environmental and Social Management Plan (ESMP) and Gender Action Plan (GAP) monitoring during implementation

During the implementation of the HydroSOS-BaNe Project, the Environmental and Social Management Plan (ESMP) and Gender Action Plan (GAP) monitoring will play a critical role in ensuring sustainable and inclusive project outputs. The ESMP will guide the mitigation, monitoring, and management of identified environmental and social risks, including impacts on water resources, biodiversity, livelihoods, and community wellbeing. Simultaneously, the GAP monitoring framework will ensure that gender-related risks—such as unequal participation, potential exclusion of women from decision-making, or exposure to gender-based violence—are proactively addressed through continuous assessment and corrective measures as presented under the Annex 4: Gender Assessment and Gender Action Plan (GAAP) for HydroSOS-BaNe project. Dedicated budgetary allocations has been included in the project's detailed budget to support the effective implementation, monitoring, and reporting of ESMP and GAP activities. This will cover capacity building, stakeholder engagement, environmental monitoring, grievance redress mechanisms, and gender-responsive interventions, ensuring that both environmental sustainability and social equity are achieved throughout the project lifecycle.

### Monitoring and evaluation arrangement for Project Management

The Project Management Unit (PMU) will be equipped with monitoring and evaluation tools of project activities and resources. The PMU under the implementing and executing agencies will ensure that the executing agencies have adequate resources and capacity to measure and monitor results at the local, national and transboundary levels. Quarterly monitoring and annual evaluation reports from the executing agencies, along with financial statements and resource management reports, will be submitted to the implementing agency (WMO) and further to the Adaptation Fund Secretariat for review.

Monitoring and evaluation assessment of the activities will be conducted regularly with the local, national and regional agencies and communities. Following each assessment, a report will be prepared to track progress made since the start of the project and in particular from the previous reporting period. The reporting will include, but not be limited to, the following:

**Table 19: M&E reporting contents and description**

Report content	Additional Description
Progress on the project's objective and outcomes – each with indicators, baseline data and end-of-project targets;	aggregated, gender disaggregated, percentage of change
Project outputs delivered per outcome (quarterly, half-yearly and yearly);	Activities completed for each output in the reporting period as compared to planned
Lessons learned/good practice and challenges;	Check or assess the real benefits to the stakeholders or challenges encountered
Progress on work plan and expenditure reports; and	Update on the work plan and use of funds
Project Environmental, Social, and Gender related risks monitoring and adaptive management.	Any grievance or risk encountered during the period; any measures taken to mitigate and manage it
Any other information as required	

**Table 20: Monitoring and Evaluation reports for project activities and management:**

<b>Quarterly report</b>	Monitoring will be carried out after each quarter and reports will be prepared with key performance indicators, results achieved, issues encountered or potential problems and proposed solutions.
<b>Annual Report</b>	An annual report will be prepared to monitor the progress in the time period of twelve months. This will be useful to monitor progress made in different activities. The annual report will be presented by the project management unit to the Adaptation Fund (during submission of the yearly project progress report) and project advisory committee to assess the overall progress and provide their suggestions or feedback.
<b>Mid-term Assessment Report</b>	The project management will hire an independent evaluator to conduct the mid-term review after two years of kick-off to get the feedback of project stakeholders and external experts including suggestions for way forward.
<b>Final Evaluation or Project Termination Report</b>	After completion of the project, an independent evaluation will be conducted to check the overall impact of the project. The final evaluation report will be developed and presented to the Adaptation Fund secretariat and Board, project advisory committee and other stakeholders.

**Table 21: The M&E activities with their implementation plan are shown below:**

Monitoring & Evaluation Activity List	Account-able Parties (short name)	Timeline																Budget allocation
		2026		2027				2028				2029				2030		
		Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	
Design, development, and review of the Monitoring and Evaluation tools including for the ESMP and GAP implementation	WMO/ NMHSs	X																8000
Monitoring the project activities including the ESMP and GAP implementation and outputs (quarterly)	NMHSs and NIPs		X	X	X	X		X	X	X		X	X	X		X	X	55000
Improvement or additional changes in the Monitoring tool based on the feedback received	WMO/ NMHSs			X														2000
Monitoring the activities and reporting the project outputs (Annually)	WMO/ NMHSs				X			X				X				X		10000
Mid-term Evaluation of the project activities and assessing the project progress including the status and implementation of ESMP and GAP	WMO/ NMHSs								X									60000
Final or Termination evaluation and reporting (after the completion of the project) including the monitoring and implementation status of ESMP and GAP	WMO/ NMHSs															X		65000
Total																		200,000

A detailed M&E tool (including updated baseline, KPI, target to be achieved etc.) will be made available for project activities, as well as for the project management team before the inception phase of the project which will be validated by various stakeholders.

#### Yearly PPR and Project Completion Summary Report

As per reporting requirements of the Adaptation Fund, the Implementing and Executing entities will prepare the yearly PPR report based on the implementation of the activities and submit it to the Adaptation Fund for review and endorsement. Also, IE in joint collaboration with the EEs will develop HydroSOS BaNe project completion summary report (consists of narrative and financial information) within six (6) months after project completion in a reader friendly format by compiling information from the submitted single-year PPRs.

#### E. Include a results framework for the project / programme proposal, including milestones, targets and indicators.

The results framework of the project defines the key performance indicators (KPI), baseline situation and means of verification for every component, outcomes, outputs and its activities. The KPI will be used during the monitoring and evaluation to assess the progress and divulge any scope for improvements. The regional entities and national agencies from the two countries will be involved (check Annex 5 for the list of agencies who will be participating) in the finalization of the project result framework during the inception phase of the project mainly to review and update the data and information pre-filled in the below table.

**Table 22: HydroSOS-BaNe Project Result Framework**

Objectives	Key performance Indicator (with Gender disaggregated) aligned with the core AF results framework indicators	Overall Baseline (based on previous AF funded projects in the past) at the project approval stage	Target to be achieved (with Gender disaggregated)	Methods of Verification	Responsibility	Frequency	Assumptions for each outcome
The proposed project objective is to enhance the climate adaptive capacities and resilience of communities in the Ganga-Brahmaputra-Meghna (GBM) River Basin in Bangladesh and Nepal by strengthening capacity and capabilities of the agencies and communities with climate change adaptation and risk reduction measures such as risk maps and EWS reducing vulnerability to hydro-climatic risks and supporting in diversifying and reinforcing livelihoods through climate-resilient strategies to secure sustainable income.	1-By year 3, More than 500,000 direct beneficiaries (200,000 women and 100,000 youths) involved or have understanding of risk maps, EWS and climate change adaptation measures at national and local levels	1-Insufficient understanding, unavailability and engagement (less than 100,000 out of which 30,000 women and 15,000 youths are involved or aware of) of stakeholders in the development of risk maps, EWS and climate change adaptation measures at national and local levels	•By Year 4, development of the national risks maps and end-to-end web-based transboundary early warning systems covering 70% (200,000 km <sup>2</sup> ) areas for floods and drought events (direct beneficiaries up to 1,000,000 out of which 400,000 women and 1,000,000 youths are involved or supported with) to improve climate resilience.	<ul style="list-style-type: none"> <li>• Web-based monitoring and early warning system for floods and drought</li> <li>• Monitoring and evaluation reports</li> <li>• Field visits reports</li> <li>• Success stories from the pilot testing</li> <li>• Workshops and trainings participation lists</li> <li>• multi-media channel report</li> </ul>	PM with PMU	Annually	<ul style="list-style-type: none"> <li>• Availability of Resources (data, information, infrastructures, human resources, etc.) from the countries</li> <li>• Representatives of the national hydrological and meteorological agencies use the products and services delivered in future work or projects.</li> </ul>
	2-By year 3, 5,000,000 indirect beneficiaries (2,000,000 female and 800,000 youth indirect beneficiaries) using or benefiting from risk maps, EWS and climate change adaptation measures at national and local levels	2- Existing indirect benefit to 1,000,000 out of which 200,000 women and 200,000 youths	By year 4, indirect support to 10,000,000 beneficiaries with 400,000 women and 1,000,000 youths in using the risk maps and EWS for improving climate resilience				
	3-By year 2, establishment of one functional transboundary and national integrated flood and drought early warning systems (no of Municipalities covered),	0 (10)	1 (by Year 4, establish a transboundary and national integrated flood and drought EWS covering more than 100 Municipalities)				
	4- By year 3, 80% progress in the Geographical coverage of the EWS to cover population with early warning services (1,000,000 women and 500,000 youths are involved as beneficiaries of	10,000 km <sup>2</sup>	By year 4, 200,000 km <sup>2</sup> area is covered by EWS (10,000,000 have direct access to the early warning services out of which 4,000,000 are women and 1,000,000 are youths)				

	the early warning services)						
	5- By year 3, 10,000 Households with increased access to livelihood assets, sustained climate-resilient livelihoods	100,000 households have on an average 1,100 USD per year through Agriculture, Fishing and construction work	By year 4, more than 1,000,000 households will have the income increased to 1300-1500 USD per year (20% more) through Agriculture, Fishing and construction work				
	6- By year 3, Number of policies and plans reviewed and updated	0	By year 4, 10 policies, plans, and guidelines are reviewed, updated and are fully inclusive of water management issues, and address community concerns				
Outcome 1.1 Floods and drought risks informed decision-making at the regional, national and local levels	By year 2, number of Flood and Drought risk maps developed for the GBM countries or region with updated data from 2025 and through trained staff of government staffs, academia and NGOs (1000 people involved and more than 40% are women and youths participating to the training workshops)	National risk maps, reports and documents do not contain updated information on flood and drought vulnerabilities and exposure (less than 20% of women and youths are involved or aware of) for the GBM targeted countries, or on their consequences for human and natural resources.	By year 3, development and availability of one Flood and Drought national risk maps with updated data and information (with direct beneficiaries to use the risk maps of more than 1,000,000 out of which 400,000 female and 1,000,000 youth) for risk-informed decision-making for saving lives and long-term risk management strategies	Web-based risks maps, Field visit reports, and Monitoring and Evaluation reports and social media posts/reports	PM with PMU	Annually	Active involvement of stakeholders and availability of information Beneficiaries will implement the techniques and tools which are disseminated and used in other regions
Output 1.1.1 Vulnerability and exposure assessment (including gender and sector-wise analyses) and risk maps are developed for the two GBM countries	By year 1, 10 data collection field visits/meetings are planned for collecting updated information (more than 1000 women and youths are involved) on vulnerabilities, capacities, exposure and risks and will be used for the development of risk maps (more than 10,000 km2 covered)	There is a lack of updated and integrated information (sex dis-aggregated data at household level and by age) for Floods and Droughts related vulnerability and exposure maps for the GBM countries or region	By year 2, following 10 meetings/field visits, the available updated data on vulnerabilities, capacities, exposure and risks will be collected and used for developing a national risk database and risk maps for floods and drought for each country (covering 200,000 km2).	Reports with information on vulnerabilities, capacities, exposure and risks of the GBM countries or region. Centralized database with risk-related information is available for future update and use. Communication documents	PMU with NWG	Quarterly	Data and information related to population, infrastructures, livelihoods, economic, hazards etc. are available for the two GBM project countries
	By year 2, progress in terms of developing the risk maps based on vulnerability and exposures analysis of	0 (No updated database related to flood and drought related risks is available with data and information of	By Year 2, one centralized database and one national level flood and drought risk maps (200,000 km2				

	GBM Basin (more than 10,000 km <sup>2</sup> surface area covered, 100 women and youth involved)	2025 (only 20% data related to women and youths are available and involved)).	covered) for each of the targeted country will be developed with the available updated information.				
Output 1.1.2 Develop capacity and awareness at the local, national and regional levels to ensure risk informed decision-making	By year 1, progress in the development and availability of an IT-based information database system in each country for sharing metadata related to vulnerability, exposure, and risk maps from existing resources or projects.	No national centralized database for sharing metadata related to vulnerability, exposure, and risk maps (less than 30% data related to women and youths are collected, stored and shared) are available.	By Year 2, the centralized national database containing data and information on the vulnerability and exposure related variables are available for the two GBM countries.	Technical report of the activity, Monitoring and Evaluation reports, Meeting reports	NWG with support from PMU	Monthly	
	By year 2, at least 1 knowledge-sharing workshops (more than 40% are female and youth participants) on risk related databases and flood/drought risk maps, future climate change impacts are organized.	The risks related to Floods and Droughts are not well identified (potential impact related information for women and youths and other vulnerable groups are not available) or adequately considered by the different actors in the GBM countries	By year 2, At least three workshop per country will be organized to disseminate knowledge on VCERs database and Flood and Drought risk maps (40% of the participants are women and youths)	Reports of consultation workshops	NWG with support from PMU	Monthly	There is adequate staff in the national agencies of the two countries with knowledge and skills in GIS, IT, and risk assessment.
Output 1.1.3 Long-term risk management strategies identified and integrated into development plans (economic, social, environmental aspects)	By year 2, 3 capacity development workshop and training of the relevant stakeholders (Number of women and youth are involved and are aware of) on the development of the transboundary and national risk management strategies linked with the policies and action plans of the countries are organized	Zero guideline on transboundary and national risk management strategies (less than 20% women, youths and elderly are consulted or involved) into development policies and plans are not available to policymakers in the two GBM countries	By Year 3, 3 regional and national workshops are conducted with the involvement of various policymakers and professional staffs of agencies in designing the transboundary and national long-term risk management strategies (more than 50 participants are women and youth) linked with the policies and action plans of the countries	Project technical reports, Monitoring and evaluation report	PMU with NWG	Quarterly	Availability of the policy makers from the countries to support in the designing and development of the strategies. The available information from the long-term risk management strategies will be used in the future planning and development projects
<b>Outcome 1.2</b> Preparedness and resilience to climate change promoted through innovative and community-based initiatives.	By year 3, 10 communities (targeting more than 200,000 people (50% women and youths) are invited in different workshops or awareness session) to strengthen preparedness and resilience (through	Only about 10–15% of target communities possess flood and drought management tools or awareness, and women's participation is limited to 10%.	By project end, at least 10 communities in each country (5000 participants are women and youths) are involved during the design and implementation of the community-based flood and	Community based flood and drought management activities report, monitoring and evaluation report	PM with PMU	Annually	Participation of women (due to cultural norms), the elderly, and youth in trainings and workshops, as well as in future activities under the End-to-End Early Warning System for flood

	gender-responsive, nature-based solutions) to climate change events.		drought management activities (integrating gender-responsive, nature-based solutions) and have strengthen preparedness and resilience to climate change events				forecasting and flood and drought management. In future, the countries are expected to plan, design and build natural and nature-based solutions for DRR and climate change adaptation measures after adequate EIA and SIA studies.
Output 1.2.1 Implementation of community-based floods and drought management strategies in vulnerable sites and different ecosystems	By year 3, at least 20 communities (covering 100,000 people and more than 40% involvement from women and youths) are involved in designing and developing necessary preparedness (early warning and monitoring system) and resilience capacities on climate change events	only about 10–20% of the 20 targeted communities possess functional early warning or hazard monitoring systems, and community awareness and preparedness are low (only 10% women and youths are involved and have necessary capacities)	By year 3, At least 20 local communities (direct benefiting 100,000 people (indirectly benefiting 500,000) and more than 40,000 beneficiaries are women and youths) in two countries country have necessary preparedness (early warning and monitoring system) and resilience measures.	Community-based management manual with implemented activities, Field visits reports, Feedback or voices from the stakeholders	PMU with NWG	Quarterly	Local authorities and community continuous participation and engagement during the entire process or activities
Output 1.2.2 Strengthened awareness of vulnerable communities and agencies on hydro-meteorological risks through education programs including nature-based solutions and mainstreaming gender	By year 3, at least 1 national and local workshops are organised for 200 participants each (more than 40% are women and youth to develop capacities of the participants on gender mainstreaming and nature-based solutions for flood management	Unavailability of knowledge, tools and awareness (only 10% women and youths have been involved) on mainstreaming gender and natural and nature-based solutions for flood management	At the end of Year 4, at least 1 national and local workshop per each country is conducted with 200 participants (100 participants are women and youths) and have knowledge and tools on gender mainstreaming and nature-based solutions for flood management	Report of technical workshops, Feedback report of the workshop, Monitoring and evaluation report	PMU with NWG	Quarterly	In future, the countries are expected to plan, design and build natural and nature-based solutions for DRR and climate change adaptation measures after adequate EIA and SIA
<b>Outcome 2.1</b> A web-based Hydrological Status and Outlook System for EWS is designed and developed together with the National services	By Year 3, progress in the establishment of transboundary Impact based forecasting and EWS for Floods and Drought and used by agencies and communities	Presently, there is no integrated transboundary impact-based forecasting and early warning systems for both Floods and Drought events	By year 4, the integrated and transboundary Flood and Drought impact-based forecasting and EWS is operational	Project technical reports, Monitoring and Evaluation reports of EWS	PM with PMU	Annually	Government agencies committed to actively participate in the design and development of EWS and to use the delivered information to address the impacts of climate change and variability
	By year 3, number of beneficiaries (at least 40% women and youths – data disaggregated by gender) are supported with	Agencies and populations (60% of women and youths) are unaware of the relevance and application of the impact-based	By year 4, at least 70 % (200,000 km2)of the region of the two countries is covered by impact-based forecasting and EWS and 1,000,000	Social media reports	PMU with NWG	Quarterly	

	impact-based forecasting and early warning information at the transboundary levels	forecasting and EWS and how to use it	directly are supported with early warning information (More than 90% of the women and youths have direct access to the EWS information)				
Output 2.1.1 Improved hydrological status and outlook instruments through data standardization for EWS is designed and developed	By year 2, 50% operationalization of Hydrological status and outlook system, IBF and EWS are available at the national and regional centers (progress in increasing the Income level).	0 (1,100 USD per year)	By Year 4, National level hydrological status (initial conditions for floods and droughts) and outlook (where in next months if the situation will get worse) for early warning services jointly with NMHSs (More than 50 trained participants are women and youths). More than 10,000,000 people receive timely and continuous warning advisory for saving lives, livelihoods, and environmental damage leading to increase in annual income (1300-1500 USD per year (20% more)).	Project technical reports, Monitoring and Evaluation reports of the modeling and forecasting	PMU with NWG	Quarterly	Hydro-meteorological data for modeling are shared by the national agencies
Output 2.1.2 Existing products and tools are integrated and visualized in the regional HydroSOS for EWS	By year 2, progress in the identification and integration of the existing information and system into the regional HydroSOS visualization platform for EWS with the national and regional agencies or partners	0	By year 4, At least existing 3 systems are integrated into the regional HydroSOS visualization platform for EWS	Consultation meeting reports	PMU with NWG	Quarterly	
Output 2.1.3 Establishment of Hydro-Climate Outlook Forums at the regional level	By year 1, progress in the establishment of the Hydro-Climate Outlook Forums at the regional level for sharing information on weather and water outlooks	0	By year 4, At least eight annual Hydro-climate outlook forums are organized at the regional level where more than 100 participants from the two countries are joining (50 are women and youth)	Workshop/forum report	PMU	Quarterly	
<b>Outcome 2.2</b> Development of medium and long-term concrete adaptation measures in the	By year 3, pilot tests are organized to assess the impact of tools and models developed	0	By Year 4, At least 10 pilot locations of each country have been tested with developed tools and models where more	Pilot-tests technical report, Monitoring and evaluation report	PM with PMU	Annually	The selected pilot sites face high rainfall or dry periods for testing the flood and drought scenario

prioritized areas and updates based on lessons learned and monitoring instruments			than 1,000,000 people (500,000 are women and youths) are benefiting from the developed EWS				including forecasting and warning dissemination
Output 2.2.1 EWS and testing of identified adaptation measures in selected vulnerable communities.	By year 2, progress in the pilot testing (identification and selection of pilot tests, monitoring during the floods and dry season, etc.) of forecasting and EWS	0	By year 4, pilot testing in at least ten locations of each country is completed and more than 1,000,000 people are involved (500,000 are women and youths)	Pilot-tests technical report, List of participants in the pilot tests, Monitoring and Evaluation reports	PMU with NWG	Quarterly	
Output 2.2.2 Coordination and collaboration developed at the regional, national and local level	By year 3, One number of workshops are organized to inform and develop the capacities of the participants to develop emergency plan including SOP for early warning communication	1	By year 4, At least 1 workshop per country is organised (40 of participants are women) to develop, validate and test the SOP for Early Warning (more than 1,000 participants are invited out of which 50% are women and youths)	Success stories, best practices, lesson learnt are shared through various social media channels so as to reach broader audience, Monitoring and evaluation report, Feedback report of the workshop	PMU with NWG	Quarterly	
Output 2.2.3 Decision-makers are informed with key water resources management parameters for current status and sub-seasonal and seasonal outlooks	By year 3, progress in the identification and implementation of the safeguard actions for water resources management based on current status and sub-seasonal and seasonal outlooks	0	By year 4, At least one annual workshop with 100 people in each country is organized (40-50 participants are women) for presenting the current status and sub-seasonal and seasonal outlooks conditions for identifying safeguard actions	Workshop reports including recommendations for safeguard actions	PMU with NWG	Quarterly	
<b>Outcome 3.1</b> Improve information base and practices related to water resource management and climate change adaptation	By year 3, 1000 people (500 are women and youths) consulted are involved through organization of workshops and meetings	0	By year 4, One decision support system framework and governance policies are established with the stakeholders (more than 40 stakeholders consulted are women and youths) with involvement of directly 10,000 people in two countries (framework and	Reports of workshop and meeting, Monitoring and evaluation report	PM with PMU	Annually	The stakeholders of the project continue to show dedication towards revising, developing, adopting policies and action plans for better climate resilience and implement interdisciplinary approaches at the national and regional levels to

			governance policies will benefit to 10,000,000 people in the two countries out of which 4,000,000 are women and youth)				integrate, tools techniques and practices
Output 3.1.1 Best practices and experience from other regions and river basins are made to ensure that existing national policies and practices are interoperable in the GBM river basin cooperation framework	By year 2, number of policies, plans and guidelines are reviewed at the national and transboundary levels identifying gaps and needs on improved water resources management and climate change adaptation	0	By year 3, At least 10 policies, plans and guidelines are reviewed at the national and transboundary levels identifying gaps and needs on improved water resources management and climate change adaptation	Reports of the desk study and meetings with the stakeholders	PMU with NWG	Quarterly	
3.1.2 Analysis and optimization of benefits of regional water and climate adaptation action.	By year 3, number of workshops organized and conducted to identify best practices (national agencies professionals, decision-makers, policymakers) and approaches for water resources management, flood and drought risk reduction, and climate adaptation-related measures (number of women and youth participation)	0	By year 4, one workshop each at national and transboundary levels is conducted (with 100 participants out of which more than 40 participants are women and youths ).	Reports of technical workshop, best practices and success stories are reported from the workshop, Monitoring and evaluation report	PMU with NWG	Quarterly	
Output 3.1.3 Experiences of local communities on key long-term strategies for floods and drought management are collected	By year 3, Progress in organizing meetings or consultation workshops at the local level (Number of women, elderly, and youths consulted)	0	By year 4, more than 20 meetings or consultations take place with 5,000 people from the two countries (more than 2000 of stakeholders consulted are women and youths) at various local regions of the GBM Basin region.	Consultation or meeting reports	PMU with NWG	Quarterly	
<b>Outcome 3.2</b> National adaptation strategies (i.e. NAPs) are fully inclusive of water management issues, address community	By year 3, workshops are organized and conducted to discuss and present the opportunity to improve the existing plan, policies and	0	By year 4, 10 policies, plans, and guidelines are reviewed, updated through multiple workshops and are fully inclusive of water management	Reports of technical workshop, Monitoring and evaluation report	PM with PMU	Annually	Training/ Consultation workshops will provide policymakers with the capacity to integrate

concerns. Methodology and mechanisms for leveraging and sharing benefits of optimizing adaptation at regional level are in place.	guidelines including the involvement of the local stakeholders (number of women and youths involved)		issues, and address community concerns (more than 100 people are consulted and 50 are women and youths).				experiences from the project into
Output 3.2.1 An inclusive process is developed to ensure that National adaptation strategies explicitly address water-relevant instruments and strategies. Inclusive approaches are operational to include local communities.	By year 3, a number of transboundary consultative workshops were organized with the policymakers and advisors (with 100 participants) including communities (Number of women and youth participants)	0	By year 4, one transboundary consultative workshop is conducted with 100 participants (with 40 participants are women and youth) from each country of the GBM region	Reports of technical and consultation Workshop, List of participants, Monitoring and evaluation report	PMU with NWG	Quarterly	
Output 3.2.2 Regional mechanism for adaptation cooperation on HydroSOS established and operational. Periodic review and update of the mechanism is agreed on by riparian states.	By year 3, Consultative meetings and workshops (Number of women and youths are involved and consulted) are national level are organized to identify and link National Programmes and the HydroSOS-BaNe project including Identify roles and responsibilities and define the coordination mechanism to review and update the implementation of the climate change adaptation measures	0	By year 4, At least one workshop and meetings are organized with more than 100 stakeholders (at least 40 are women and youth) at national levels	Consultation meeting report, Monitoring and evaluation report	PMU with NWG	Quarterly	

**TABLE 23: LIST OF TABLES FOR REPORTING ADAPTATION FUND CORE IMPACT INDICATORS FOR THE HYDROSOS BANE PROJECT<sup>51</sup>**

Adaptation Fund Core Impact Indicator “Number of Beneficiaries”	
<b>Date of Report</b>	To be filled during reporting
<b>Project Title</b>	Hydrological Status and Outlook system for integrated water resources management and climate resilience in Bangladesh and Nepal (HydroSOS-BaNe)
<b>Country</b>	Bangladesh and Nepal
<b>Implementing Agency</b>	World Meteorological Organization

<sup>51</sup> The data on the baseline and target at the approval has been added based on the EEs review existing on-going and planned projects support from the Adaptation Fund, World Bank, Asian Development Bank etc. and the targets proposed under the developed EW4All roadmaps (unpublished) of the two countries.

<b>Project Duration</b>	4 years			
	Baseline ( <i>absolute number</i> )	Target at project approval ( <i>absolute number</i> )	Adjusted target first year of implementation ( <i>absolute number</i> )	Actual at completion <sup>52</sup> ( <i>absolute number</i> )
<b>Direct beneficiaries supported by the project (total for all activities under each component)</b>	100,000	1,000,000	To be filled at first year	To be filled at the end of the project
<i>Female direct beneficiaries</i>	30,000	400,000	To be filled at first year	To be filled at the end of the project
<i>Youth direct beneficiaries</i>	15,000	100,000	To be filled at first year	To be filled at the end of the project
<b>Indirect beneficiaries supported by the project (total for all activities under each component)</b>	1,000,000	10,000,000	To be filled at first year	To be filled at the end of the project
<i>Female indirect beneficiaries</i>	200,000	4,000,000	To be filled at first year	To be filled at the end of the project
<i>Youth indirect beneficiaries</i>	200,000	1,000,000	To be filled at first year	To be filled at the end of the project

<b>Adaptation Fund Core Impact Indicator “Early Warning Systems”</b>				
<b>Date of Report</b>	To be filled during reporting			
<b>Project Title</b>	Hydrological Status and Outlook system for integrated water resources management and climate resilience in Bangladesh and Nepal (HydroSOS-BaNe)			
<b>Country</b>	Bangladesh and Nepal			
<b>Implementing Agency</b>	World Meteorological Organization			
<b>Project Duration</b>	4 years			
	Baseline (Category-number)	Target at project approval	Adjusted target first year of implementation	Actual at completion
<b>Adopted Early Warning Systems</b> ( <i>Category targeted – 1, 2, 3, 4; and absolute number</i> ) (1) risk knowledge, (2) monitoring and warning service, (3) dissemination and communication, (4) response capability. (report for each project component)	1- 0 2- 0 3- 0 4- 0	1- 1 2- 1 3- 1 4- 1	To be filled at first year	To be filled at the end of the project
<b>Hazards</b> ( <i>report for each project component</i> )	Floods and Drought	Floods and Drought	To be filled at first year	To be filled at the end of the project
<b>Geographical coverage</b> ( <i>km2</i> ) ( <i>report for each project component</i> )	1- 10,000 km2 2- 10,000 km2 3- 10,000 km2 4- 10,000 km2	1- 200,000 km2 2- 200,000 km2 3- 200,000 km2 4- 200,000 km2	To be filled at first year	To be filled at the end of the project
<b>Number of municipalities</b> ( <i>number</i> ) ( <i>report for each project component</i> )	1- 10 2- 10 3- 10	1- More than 100 2- More than 100 3- More than 100	To be filled at first year	To be filled at the end of the project

<sup>52</sup> At project completion, the proponent could report on % targeted population reached or successfully supported (the absolute numbers could then be deduced from that figure)

	4- 10	4- More than 100		
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Adaptation Fund Impact Indicator “Increased income, or avoided decrease in income”				
<b>Date of Report</b>	To be filled during reporting			
<b>Project Title</b>	Hydrological Status and Outlook system for integrated water resources management and climate resilience in Bangladesh and Nepal (HydroSOS-BaNe)			
<b>Country</b>	Bangladesh and Nepal			
<b>Implementing Agency</b>	World Meteorological Organization			
<b>Project Duration</b>	4 years			
	Baseline	Target at project approval	Adjusted target first year of implementation	Actual at completion
<b>Income Source</b>	Agriculture, Fishing, Construction work	Agriculture, Fishing, Construction work	To be filled at first year	To be filled at the end of the project
<b>Income level (USD)</b>	1,100 USD per year	1300 -1500 USD per year (20% more)	To be filled at first year	To be filled at the end of the project
<b>Number of households (total number in the project area)</b>	1,000,000	10,000,000	To be filled at first year	To be filled at the end of the project

#### F. Demonstrate how the project / programme aligns with the Results Framework of the Adaptation Fund

**Table 24: HydroSOS-BaNe project aligns with the Results Framework of the Adaptation Fund**

Project Objective(s) <sup>1</sup>	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator	Grant Amount (USD)
To enhance the climate adaptive capacities and resilience to hydro-climatic risks of the beneficiary communities in the Ganga Brahmaputra Meghna (GBM) River Basin in Bangladesh and Nepal through strengthened ability of agencies and communities to use climate change adaptation measures such as floods and drought for risk informed decisions about climate change driven hazards affecting their locations	Before the planned end of project in June 2030, -More than 70% of the vulnerable population (around 10,000,000) have improved preparedness and resilience to floods and drought events. This will be achieved through strengthening the capacities of national agencies' ability to monitor climate change events and provide accurate and timely forecasts and warning services to the stakeholders.	Outcome 1: Reduced exposure at national level to climate-related hazards and threats	1. Relevant threat and hazard information generated and disseminated to stakeholders on a timely basis	5,000,000
To improve awareness and enhance local ownership of climate change adaptation and risk reduction processes among communities and local institutions	Before end of the year 3, more than 100 Staffs (50 of women and 50 youths) of the local /national Hydrological and meteorological services and other competent authorities supporting climate change adaptation and disaster risk reduction	Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1. Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses 3.2. Percentage of targeted population applying	2,000,000

	Around 1,000,000 national and local (400,000 women and 100,000 youths) stakeholders (community representatives and local authorities etc.) demonstrating increased participation and knowledge of climate risks and adaptation measures through community-led adaptation or risk reduction initiatives implemented		appropriate adaptation responses	489,000
To adapt, diversify and strengthen the livelihoods and income sources of vulnerable households and communities in targeted areas through climate-resilient livelihood strategies	Before end of project, more than 1,000,000 households adopting at least one updated or new climate-resilient or diversified livelihood practice (e.g., drought-tolerant crops, aquaculture, etc.).	Outcome 6: Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas	6.1 Percentage of households and communities having more secure access to livelihood assets	2,000,000
To enhance and institutionalize policies, regulations, and governance frameworks that promote and enforce climate resilience and adaptation measures at national and local levels	Before end of year 4, more than 10 policies and guidelines at national and transboundary levels are reviewed for integrated flood and drought management and climate related planning and policy frameworks are updated and developed.	Outcome 7: Improved policies and regulations that promote and enforce resilience measures	7. Climate change priorities are integrated into national development strategy	511,000
<b>Total outcome level grant amount</b>				<b>10,000,000</b>
<b>Project Outcome(s)</b>	<b>Project Outcome Indicator(s)</b>	<b>Fund Output</b>	<b>Fund Output Indicator</b>	<b>Grant Amount (USD)</b>
Outcome 1.1 Floods and drought risks informed decision-making at the regional, national and local levels	By year 2, Flood and Drought national risks maps for the targeted two GBM countries/ region will be developed which provide support for disaster risk preparedness and management	Output 1: Risk and vulnerability assessments conducted and updated at a regional level	1.1. No. and type of projects that conduct and update risk and vulnerability assessments	1,000,000
Outcome 1.2 Preparedness and resilience to climate change promoted through innovative and community-based initiatives.	By year 2, 10,000 individuals in the countries with improved awareness of future risks and impacts on economic, urban, climate, environment etc. due to climate change and variability	Output 6: Targeted individual lives and community livelihood strategies strengthened in relation to climate change impacts, including variability	6.1.1. No. and type of adaptation assets (physical as well as knowledge) created in support of individual or community livelihood strategies	2,000,000
Outcome 2.1 A web-based Hydrological Status and Outlook System for EWS is designed and developed together with the National services	By year 4, 10,000,000 of the population in Bangladesh and Nepal region have access to the HydroSOS Forecasting and EWS and it has been utilized.	Output 1.2: Targeted population groups covered by adequate risk reduction systems	1.2.1. Percentage of population covered by adequate risk reduction systems	4,000,000
Outcome 2.2 Development of medium and long-term concrete adaptation measures in the prioritized areas and updates based on lessons learned and monitoring instruments	By year 4, 5 pilot locations of each GBM countries have been tested with the developed HydroSOS EWS tool and models	Output 3.1: Targeted population groups participating in adaptation and risk	3.1 No. of news outlets in the local press and media that have covered the topic	2,000,000

		reduction awareness activities		
Outcome 3.1 Improve information base and practices related to water resource management and climate change adaptation	By year 4, 10 plans, policies and guidelines on water resources management and climate change adaptation have been strengthened or updated with necessary amendments.	Output 3.2: Strengthened capacity of national and subnational stakeholders and entities to capture and disseminate knowledge and learning	3.2.2 No. of tools and guidelines developed (thematic, sectoral, institutional) and shared with relevant stakeholders	489,000
Outcome 3.2 National adaptation strategies (i.e. NAPs) are fully inclusive of water management issues, address community concerns. Methodology and mechanisms for leveraging and sharing benefits of optimizing adaptation at regional level are in place.	By year 4, more than 10,000 Locals/national/regional stakeholders have been involved to share experiences or suggestions on risk management and climate change adaptation measures integrated into national and transboundary development policies and plans.	Output 7: Improved integration of climate-resilience strategies into country development plans	7.1. No., type, and sector of policies introduced or adjusted to address climate change risks	11,000
<b>Total output level grant amount</b>				0,000,000

**G. Include a detailed budget with budget notes, broken down by country as applicable, a budget on the Implementing Entity management fee use, and an explanation and a breakdown of the execution costs.**

**H.**

The total budget of the HydroSOS-BaNe project is estimated at USD 12,090,000 for the development of activities in the two participating countries, including an amount of USD 1,000,000 for project executing entities and an amount of USD 1,090,000 to cover the expenses of the implementing entity. A detailed budget is presented below including budget notes. The disbursement schedule is presented along with funds disaggregated by activity at both country and regional levels.

**Table 25: A detailed Budget plan with Budget notes**

Budget Plan for the HydroSOS-BaNe project													
Output No and Description	Activities planned each output	Type of expenditure	No of units	Cost per units	Total costs for the activity (A)	Cost per each output (O)	Cost per each outcome (OT)	Cost per each component (C)	Y 1	Y 2	Y 3	Y 4	comments
Component 1: Risk-based preparedness and adaptation to climate variabilities, water use stresses and environmental uncertainties													
Outcome 1.1 Floods and drought risks informed decision-making at the regional, national and local levels													
Output 1.1.1 Vulnerability and exposure assessment (including gender and sector-wise analyses) and risk maps are developed for the GBM basin	Activity 1.1.1.1 Conduct a desk study (compilation of existing evidence-based past data (topographic maps, satellite images, studies of extreme events, reports of disasters, etc.) available at the national and regional levels and field visits to 10 selected pilot locations to gather available information on vulnerability and exposure for current and future climate and identify gaps or additional needs.	Desk studies and field visits	10	4000	40000	346000	1000000	3000000					The costs are related to internal or external technical organizations/experts support fees (100-200 USD per day and expected for 20 days in each country) for conducting and collecting information from the desk study and field visits. Also, the costs for travel (renting of vehicle or flight tickets etc.) to reach the study location and Daily Subsistence Allowance (DSA) to the experts and PMU staff. Also, 3,000 USD will be allocated for the implementation of GAP through a hiring of national/local gender expert, interpretation costs in local languages for women, illustrative videos or flyers etc.
	Activity 1.1.1.2 Develop an action plan (one regional and two national levels) to complement gathered information on the exposure and vulnerabilities	Desk study/meeting	3	15000	45000								The costs are related to internal or external technical organizations/experts support fees (100-200 USD per day and expected for 30 days in each country) for providing detailed report to the PMU. Also workshop related costs (venue, audio-video systems, minor catering etc.) for validations of the reports.3,000 USD for GAP implementation through gender experts for data collection and mapping of stakeholders
	Activity 1.1.1.3 Organize stakeholder consultations (two national meetings and one regional workshop), working on risk management to select priority areas for community consultations.	Workshops and consultation meetings	3	12000	36000								The Costs are related to organizing workshops (venue, audio-video systems, minor catering, flights or vehicle rents for the participants and PMU team etc.) at the national and regional levels. 3,000 USD is allocated for GAP implementation with





Output 1.1.3 Long term risk management strategies identified and integrated into development plans (economic, social, environmental aspects)	Activity 1.1.3.1 Design and develop regional/national level guideline presenting the entire process of risk maps development and future impacts on various sectors with examples of implementation on highly vulnerable urbans and agricultural areas	Desk work and technical documentation	2	8000	16000	184000						Technical organizations/partners support costs (300-500 USD per day and expected for 20 days in each country) for developing the process report for developing the risk maps and costs for conducting consultation meetings with the stakeholders.	
	Activity 1.1.3.2 Develop supplementary means of communication to reach a wider population (more than 10 infographics, posters, videos, leaflets for schools, etc. are developed and shared in various social media channels and hard copy distribution in the public events)	communication and outreach	1	8000	8000							External content developer costs (200-300 USD per day for 30-35 days) to develop communication materials (more than 10 infographics, posters, videos, leaflets for schools, etc. USD 3,000 for GAP implementation to develop Gender specific materials with Gender experts	
	Activity 1.1.3.3 Organize 20 local trainings and workshops with stakeholders (representatives of communities, local policymakers, and decision makers) to disseminate the information on future climate and risk changes and to obtain additional qualitative input on potential impacts for socio-economic and environmental aspects	national and local workshops	20	5000	100000							The proposed costs are for organizing 20 local trainings and workshops (venue, audio-video systems, minor catering, costs for campaigns in the community events, flights or vehicle rents for the local participants and PMU team etc.). USD 5,000 for gender specific technical contribution and communication	
	Activity 1.1.3.4 Develop safeguard action plan for risk management at medium and long term with the output from workshops and consultations with the relevant stakeholders (more than 1000 people are consulted during the workshops or interviews in the field)	Technical desk work with consultation workshops	2	30000	60000							The costs are related to internal or external technical organizations/experts support fees (300-500 USD per day and expected for 30-45 days in each country) for providing detailed report to the PMU and to carry out consultation meetings with the stakeholders (meeting venues, audio-video systems, etc.)	
Costs for Output 1.1.3					184000								
Costs for the Outcome 1.1.						1000000							
Outcome 1.2 Preparedness and resilience to climate change promoted through innovative and community-based initiatives													
Output 1.2.1 Implementation of community-based floods and drought management strategies in the vulnerable sites and in different ecosystems	Activity 1.2.1.1 Conduct two participatory community consultations in each of 20 vulnerable sites to identify and select the appropriate local measures or equipment (non-structural preparedness tools such as early warning dissemination through loudspeakers and local radio, locally installed rain-gauges and river-gauges for hydrological data collection, marking of	Local Consultation meetings	10	57400	574000	1570000	2000000						The proposed costs are for organizing 20 consultation workshops (venue, audio-video systems, minor catering, costs for campaigns in the community events, flights or vehicle rents for the local participants and PMU team etc.) and also expert fees (200-300 USD per day for 120 days) for facilitating the meetings with the stakeholders. USD 15,000 for hiring

	vulnerable houses for rapid response support, flood level marking plates to mark the previous year's floods useful for future construction of resilient houses, simulation exercises, knowledge and awareness session on disaster risk reduction, ecosystem services, climate change adaptation and drought indicators).																		gender experts for data collection and consultation with stakeholders for identifying gender related issues and needs.
	Activity 1.2.1.2 Develop and install the local preparedness measures (At least 5 per vulnerable site or communities) as identified with the communities under activity 1.2.1.1	Implement concrete adaptation measures	10	40000	400000														Costs related to local preparedness measures such as for installation of low costs hydro-met stations, flood level markings, purchase of the loudspeakers and amplifier, crop patterns or other adaptation measures as agreed with the community etc. USD 3,000 for GAP implementation with gender experts in the community
	Activity 1.2.1.3 Identification of existing or development of new local flood and drought management committees or groups (At least one in each site)	Consultation meetings	10	8000	80000														The proposed costs are for organizing multiple meetings (venue, audio-video systems, minor catering, costs for flights or vehicle rents for the local participants and PMU team etc.) to form or update the existing committees. Also, costs for the local authorities and external experts technical support. USD 5,000 for gender experts for technical support and information materials for women during stakeholder consultation
	Activity 1.2.1.4. Capacity building workshops (2 in each site) for local management committees or groups identified under activity 1.2.1.3	technical workshops	20	15000	300000														The proposed costs are for organizing 20 local capacity development workshops (venue, audio-video systems, minor catering, costs for campaigns in the community events, flights or vehicle rents for the local participants, and PMU team, expert fees. etc.). 5,000 USD for hiring of local gender experts for support in various workshops or meetings.
	Activity 1.2.1.5 Development of community-based flood and drought management manual (one for each country or one at the regional level) including safety and safeguard measures for preservation of natural habitats, land and soil conservation, biological diversity.	desk work with technical meetings	2	8000	16000														The costs related to internal or external technical organizations/experts support fees (300-500 USD per day and expected for 25 days in each country) for preparing and delivering the manual to the PMU. The costs also include workshop-related expenses (venue, audio-video systems, minor catering etc.) for validating the





Output 2.1.1 Improved hydrological status and outlook instruments through data standardization for EWS is designed and developed	Activity 2.1.1.1 Make an inventory of the gauging stations (20 consultation meetings with hydro-met representatives at the local levels in each country) with real-time data transfer (or pseudo real-time) in the GBM Basin and prepare descriptive sheets for each station (location, equipment, data series, etc.)	Desk work and meetings	3	40000	120000	2847000	4000000	6000000					The costs are related to internal or external technical organization/experts support fees (100-300 USD per day and expected for 120 days) and consultation related costs (venue, audio-video systems, minor catering etc.) for discussing with the local hydro-met and other experts. Also, in case of stations unavailability, procure and install new stations for receiving hydro-met data crucial for modelling and forecasting. 4,000 USD for hiring gender experts for development of participatory data collection tools	
	Activity 2.1.1.2 Perform a field visit to 40 locations and desk studies to check the availability and quality of the data and information related to runoff, rainfall and other relevant hydrometeorological and agrometeorological data and also through the flood forecasting and drought monitoring products available at each NMHSs and other relevant institutions	Field visits and consultations	40	3000	360000									The costs for field related travel (renting of vehicle or flight tickets etc.) to reach the station locations for collecting hydro-met data such as streamflow for multi situations (high flows, low flow etc.) and Daily Subsistence Allowance (DSA) to the experts and PMU staff
	Activity 2.1.1.3 Update the database of hydro-meteorological parameters with new information, or interconnect with existing platforms mainly through WMO Hydrohub (enhancing hydrological monitoring and data exchange) and World Hydrological Observing System (WHOS) mandate of standardization of data and information management systems.	Technical support and development	3	20000	60000									The costs are related to internal or external technical organization/experts support fees (100-300 USD per day and expected for 60-120 days) and consultation workshops or trainings for WHOS and HydroHub with the NMHSs. 5,000 USD for GAP implementation through gender experts involvement
	Activity 2.1.1.4 Organize 3 training workshops (one each at national levels and one at the regional level) for the NMHSs staff related to data collection, calibration and maintenance of equipment following WMO standards	Technical workshops	3	20000	60000									The costs are related to internal or external trainers/experts support fees (100-300 USD per day and expected for 120 days) and consultation related costs (venue, audio-video systems, minor catering etc.) for training of the NMHSs staff dealing with the data collection, calibration and maintenance of equipment following WMO standards. 3,000 USD for Gender specific needs and involvement through gender focal points

Activity 2.1.1.5 Define threshold descriptors for flood and drought events based on hydro-meteorological and risk maps for various risk levels (for example, low-medium-high) through 10 consultation meetings with technical services and local representatives supported by evidence-based experiences.	Technical support and development	20	12850	257000						The costs are related to internal or external technical organizations/experts support fees (200-300 USD per day and expected for 20 days) and consultation workshops or meetings related costs (venue, audio-video systems, minor catering etc.) to check and measure the Thresholds from the past floods and drought events. 5,000 USD for gender experts for technical support and discussion with stakeholders
Activity 2.1.1.6 Define the values of the thresholds for flood and for drought events, at and around each gauging station, in relationship with past events	Technical support and development	2	50000	100000						The costs are related to internal or external technical organization/experts support fees (200-300 USD per day and expected for 20 days) and consultation workshops or meetings related costs (venue, audio-video systems, minor catering, transportation allowance or DSA etc.) to define and agree on the Thresholds from the past flood and drought events. 4,000 USD for GAP implementation through gender experts for technical inputs on past events
Activity 2.1.1.7 Conduct a water resources assessment in the GBM region (10 locations in the two countries) to understand the changing value of water level, water quality, in relationship to current status and past events and for developing services for hydro-power generation, agriculture, irrigation, water utility etc.	Technical field work and support	10	25000	250000						The costs are related to internal or external technical organizations/experts support fees (300-600 USD per day and expected for 60 days) and consultation workshops or meetings to disseminate the process and tools of water resources assessment. 4,000 USD for GAP through gender experts to contribute in data collection with the stakeholders
Activity 2.1.1.8 Develop the HydroSOS products for the GBM basin (technical support to develop monthly status and outlook products and 20 training workshops at the national level) based on above defined thresholds and real time and historical information available at the National level and from Satellite based products.	Technical support and development through trainings, workshops, modelling, forecasting, tools and products	3	600000	1800000						The costs relate to internal or external technical organizations/expert support fees (300-600 USD per day and expected for 500 days) to support in developing HydroSOS products and monthly consultation workshops or trainings related costs (venue, audio-video systems, minor catering, transportation allowance or DSA etc.) to development of the hydrological status and outlook products. 20,000 USD for GAP implementation through gender experts and gender sensitive approach during workshops or meetings





Outlook Forums at the regional level	Activity 2.1.3.2 Nominate at least 10 members for the Hydrological outlook group which could be merged with the climate outlook forum at the regional level	Desk work	1	8000	8000								The costs are related to internal or external technical organizations/experts support fees (100-200 USD per day and expected for 10 days) and mini workshop with the NWG to finalize the hydrological outlook group
	Activity 2.1.3.3 Organize 4 annual regional Hydro-climate outlook meetings in each country with the existing and nominated members	National/regional workshops with stakeholders	8	45000	360000								Conducting workshops (venue, audio-video systems, minor catering, transportation allowance or DSA, facilitator costs, flights cost for the external participants etc.) in the targeted countries. 16,000 USD for GAP implementation through national/regional gender experts for technical inputs and consultation with stakeholders
	Activity 2.1.3.4 Develop national and regional guidance documents for regular coordination and meetings with the Hydro-climate outlook members	Desk work with technical advice	1	20000	20000								
Costs for the Output 2.1.3					396000								
Total costs for the Outcome 2.1					4000000								
Outcome 2.2 Development of medium and long-term concrete adaptation measures in the prioritized areas and updates based on lessons learned and monitoring instruments													
Output 2.2.1 EWS and testing of identified adaptation measures in selected vulnerable communities.	Activity 2.2.1.1 Discuss the selection of the 10 pilot test areas with the concerned agencies and communities (10 meetings) based on the list presented in Table 4 to confirm whether they still remain applicable for the testing of the HydroSOS EWS during monsoon and dry season.	Desk work with technical meetings	10	8000	80000	1816000	2000000						Conducting consultation meetings (venue, audio-video systems, minor catering, transportation allowance or DSA, facilitator costs, flights cost for the external participants etc.) in the targeted pilot areas in the two countries. Field Visits to discuss with the stakeholders to see the past impacts of flooding. 5,000 USD for GAP implementation and support through gender experts
	Activity 2.2.1.2 Organize meetings on each of the pilot sub-areas (30 locations in total) to identify the roles and responsibilities of the different stakeholder groups during the tests and present the coordination and collaboration mechanism enabling first responders to efficiently receive and use the HydroSOS early warning information	National and local workshops	30	52000	1560000								

													having gender sensitive materials and tools during simulation exercise.
	Activity 2.2.1.3 Identify good practices, challenges and limitations of products and services during the Flood and Drought events at each of the 10 pilot testing locations (conduct 2 meetings at each site)	Desk work with technical support	20	5000	100000								Based on pilot testing experience, consultation meetings related costs (field travel, venue, minor catering, local allowance etc.) will allow to gather good practices, challenges and scope for improvements. 5,000 USD for hiring of local gender experts for collecting good practices, challenges and limitation etc.
	Activity 2.2.1.4 Raise awareness about the pilot testing using multi-media channels (develop one video for each country)	Communication and outreach	2	13000	26000								Development of the awareness raising materials through the content developer experts (200-300 USD for 40 days) and dissemination and promotional events in the local areas or communities (display screens, pamphlets or brochures etc.).2,000 USD for developing gender specific materials for awareness raising
	Activity 2.2.1.5 Develop the national level action plan (2 in total) to further improve products and services after the pilot testing	Desk work with technical support	2	25000	50000								The costs are related to internal or external technical organizations/experts support fees (300-400 USD per day and expected for 50 days) and mini workshops (logistical arrangements) with the stakeholders to finalize the action plan. 3,000 USD for gender expert to provide technical inputs
Costs for Output 2.2.1					1816000								
Output 2.2.2. Coordination and collaboration developed at the regional, national and local level	Activity 2.2.2.1 Organize 4 national consultative workshops (with participants from local/national agencies involved in Floods and Drought management) to share the knowledge (new methodologies, concepts and tools for effective forecasting and dissemination of early warnings) from the pilot tests	National consultative workshops	4	12000	48000	98000							Conducting workshops (venue, audio-video systems, minor catering, transportation allowance or DSA, facilitator costs, flights cost for the external participants and PMU etc.) in the targeted countries. Facilitator costs for leading the workshops in local language and reporting purposes. 5,000 USD for gender experts involvement and support



<p>Output 3.1.1 Best practices and experiences from other regions and river basins are made to ensure that existing national policies and practices are interoperable in GBM river basin cooperation framework</p>	<p>Activity 3.1.1.1 Conduct a desk study, and hold 10 meetings with stakeholders, to identify the status of climate and future socio-economic changes in the transboundary governance plans, policies and guidelines for flood and drought management in Bangladesh and Nepal</p>	<p>Consultation meetings, desk work with technical support</p>	10	5000	50000	239000	489000	1000000					<p>The costs relate to internal or external technical organizations/expert support fees (100-200 USD per day and expected for 20 days in each country) for conducting and collecting information from the desk study and field visits. Also, the costs for travel (renting of vehicle or flight tickets etc.) to reach the study location and DSA to the experts and PMU staff. 3,000 USD for GAP implementation with gender experts involvement in the meetings</p>
	<p>Activity 3.1.1.2 Develop 3 short reports (one for the country and one at the regional level) underlining the strengths together with the identified gaps and additional needs related to climate and development impacts in the GBM regional</p>	<p>Documentation and reporting</p>	3	4000	12000								<p>Costs will also include data collection and analysis, stakeholder consultations at the national and regional levels (virtual or in-person), and report production, including editing, formatting, and translation where necessary. Additional provisions are included for project coordination, technical review, and communication of findings through digital or print dissemination channels. 1,000 USD for GAP implementation with gender focal points inputs and feedback</p>
	<p>Activity 3.1.1.3 Organize and conduct national (4 in total) and 2 regional workshops to review, propose updates and implementation arrangements on existing plans, policies and guidelines on water resources management and climate change adaptation in the GBM Basin.</p>	<p>Regional and national Training/ Workshops (3-4 days)</p>	6	14000	84000								<p>The costs are related to internal or external experts support fees (400 USD per day and expected for 10 days) and Consultation workshops (venue, audio-video systems, minor catering, transportation allowance or DSA etc.) in each country. 5,000 USD for GAP implementation through gender experts or focal points technical inputs</p>
	<p>Activity 3.1.1.4 Develop and propose long-term actions (through one national workshops and one regional workshop) for strengthening resilience and capacities at transboundary, national and local levels to be implemented by NMHSs and other regional agencies</p>	<p>Desk work with technical support</p>	3	10000	30000								<p>Costs for the expert's service fees 400 USD per day and expected for 10 days) and National Consultation workshops for 50 participants (venue, audio-video systems, minor catering, transportation allowance or DSA etc.) in each country. 7,000 USD for GAP implementation through gender experts or focal points technical inputs</p>
	<p>Activity 3.1.1.5 Collect feedbacks, suggestions and recommendations from the workshop participants on the links between activities of National Programmes</p>	<p>Data collection with reporting</p>	3	6000	18000								<p>Costs for the expert's service fees to collect feedback and develop recommendation reports shared with the workshop participants</p>



Output 3.2.1 An inclusive process is developed to ensure that National adaptation strategies explicitly address water-relevant instruments and strategies. Inclusive approaches are operational to include local communities.	Activity 3.2.1.1 Prepare/suggest updates of framework (1 each at national level and 1 at the regional level) for adapting the National adaptation strategies with safeguard actions on long term water resources management, climate change adaptation and disaster risk reduction with local stakeholders	Desk work with technical support	3	20000	60000	223000	511000						The costs are related to internal or external or facilitator/experts support fees (200 USD per day and expected for 30 days) including desk study and meetings with the stakeholders. 3,000 USD for GAP implementation with gender sensitive information, materials and gender experts participation	
	Activity 3.2.1.2 Conduct community-based workshops (10 each at the national level and 3 at the regional level to share results) with agencies, local communities/ organizations and other relevant stakeholders to identify and prioritize adaptation measures	local Consultation workshops	23	5000	115000									The costs are related to internal or external or facilitator/experts support fees (200 USD per day and expected for 30 days) and Consultation meetings (venue, audio-video systems, minor catering, transportation allowance or DSA etc.) in each country with local stakeholders. 5,000 USD for GAP implementation through national/regional gender experts for technical inputs and consultation with stakeholders
	Activity 3.2.1.3 Collect feedback, suggestions and recommendations	Data collection with reporting												
	Activity 3.2.1.4 Propose national and local level action plans to review and improve the National Adaptation strategies together with the local communities	Desk work with technical support (10 local sites and 2 national levels) and workshops	6	8000	48000									The costs are related to internal or external facilitator/experts support fees (200 USD per day and expected for 30 days) including desk study and meetings with the stakeholders. 4,000 USD for GAP implementation with gender experts
Costs for Output 3.2.1					223000									
Output 3.2.2 Regional mechanism for adaptation cooperation on HydroSOS established and operational. Periodic review and update of the mechanism are agreed on by riparian states.	Activity 3.2.2.1 Organize and conduct workshops (10 at the national level and two at the regional level) to disseminate the results of Hydro-SOS EWS and associated products on climate adaptation for the GBM	Capacity development workshops	12	14000	168000	288000							Costs for the expert's service fees (400 USD per day and expected for 60 days) and National Consultation workshops for 50 participants (venue, audio-video systems, minor catering, transportation allowance or DSA etc.) in each country. 10,000 USD for GAP implementation through national/regional gender experts for technical inputs, support in feedback collection and consultation with stakeholders	
	Activity 3.2.2.2 Collect feedback, suggestions and recommendations from the workshop participants on the links between activities of National Programmes and the HydroSOS-BaNe project	Data collection with reporting												
	Activity 3.2.2.3 Identify roles and responsibilities of the individual agencies or organizations at the 10 locations and define coordination mechanism to review and update the implementation of the climate change adaptation measures based on good	Technical documentation with stakeholders consultation	10	12000	120000									The costs are related to internal, or external experts support fees (200 USD per day and expected for 40 days) including desk study and meetings with the stakeholders (travel costs to visit agencies). 3,000 USD for GAP



**Table 27: Implementing Entity Fee Breakdown**

<b>Implementing Entity Fee Breakdown</b>			
<b>Activities</b>	<b>Responsibilities</b>	<b>Total USD</b>	<b>Notes</b>
Overall coordination and management with the Adaptation Fund Secretariat	Project Coordinator	500,000	The staff cost is for four years of the project accounting 50-60% support from the full-time position. The project coordinator will lead the implementation of the project activities jointly with other Project Officers of the EEs
Management of project implementation with the Executing agencies and project development with the Advisory Committee			
Financial management, including accounting and grant management to Executing entities and third parties		60,000	Support in management of the expenditure management and financial reporting
Information and communication management		10,000	Support in developing project website and communication materials (flyers and brochures etc.)
Environment and Social (E&S) Risk Monitoring		10,000	Costs for providing support to the E&S risk monitoring and management (in case of travel to the countries or local area or to organize any mitigation/management measures)
Quality assurance including internal and external audits	At midterm and final evaluation	30,000	-Ensure compliance with internal and external audit requirements -Set out financial reporting (in compliance with WMO and Adaptation Fund standards) -Ensure accountability and incorporation of lessons learned
Participation of WMO staff and advisory committee in project activities		20,000	Travel costs for the WMO executive and advisory committee members to participate in meetings
Monitoring and Evaluation		200,000	Costs for developing M&E information (baseline and targets) tool, ESMP implementation, GAP monitoring, quarterly, annually and mid-term and final evaluations of the HydroSOS BaNe project
WMO administration support fee		260,000	WMO project support costs to host the project coordinator and administration support
<b>Total</b>		<b>1,090,000</b>	

**Table 28: Executing Entity Fee Breakdown**

<b>Executing Fee Breakdown</b>				
<b>Entity</b>	<b>Execution activity</b>	<b>Role</b>	<b>USD</b>	<b>Notes</b>
WMO	Execution of the activities under component 1 (especially activities 1.1.2.3, 1.1.2.4, 1.2.1.1, 1.2.1.2, 1.1.3.3, 1.1.3.4) and component 2 (especially activities 2.1.1.3, 2.1.1.5, 2.1.1.7, 2.1.1.8, 2.1.2.1, 2.1.2.2, 2.1.2.7, 2.1.2.3, 2.1.3.3) and technically support to component 3	Execution costs including WMO procurement and contracting support with technical partners for implementation of activities proposed under components 1 and 2	150,000	As WMO needs to carry out additional roles and responsibilities in the direct execution of specific activities under components 1 and 2 as agreed with the other EEs and supported by the NDAs of the two project countries (the NDA's support letters are provided in Annex 7 or available on pages 55 and 57 of the endorsed concept note, available at the link below. <a href="https://www.adaptation-fund.org/project/hydrological-status-and-outlook-system-for-integrated-water-resources-management-and-climate-resilience-in-bangladesh-and-nepal-hydrosos-bane/">https://www.adaptation-fund.org/project/hydrological-status-and-outlook-system-for-integrated-water-resources-management-and-climate-resilience-in-bangladesh-and-nepal-hydrosos-bane/</a> ), it is proposed that 15% (rather than 1.5%) of the execution fees be allocated to all executing entities. The execution fee of 150,000 USD to WMO has been agreed upon with the other executing partners and will allow WMO to use its procurement and human resources staff to support the low cost procurement process (as United Nations entity, not paying VAT or excise duty instead of pay 15% VAT or excise duty charges in case other Executing Entities will carry out the work) and technical support (contracting of technical partners to provide free, tailored and sustainable solutions) through a legal financial partners contracting. To note: the activities costs for any procurement and technical support will not be taken by WMO; rather, it will be allocated to the technical partners for support and benefit of the countries.
NMHSs Bangladesh	Project personnel and administration	Support with the 2 National Project officers stationed at the BMD and BWDB	300000	Project personnel salary for the 4 years of the project implementation

NMHSs Nepal	Project personnel and administration	Support with the 2 National Project officers stationed at DH Nepal	300,000	Project personnel salary for the 4 years of the project implementation
NMHSs Bangladesh and Nepal and external partners	Information management and communication costs		70,000	Support for knowledge management and communication activities at the national and local levels through consultants or specialized organizations
EEs (BMD, BWD, DHM and WMO) for executive management support for E&S Risk Monitoring	Environment and Social (E&S) Risk Monitoring		20,000	Costs for providing support to E&S risk monitoring and management (in case of travel to the countries or local areas, or for organizing any mitigation/management measures)
WMO/NMHSs Bangladesh and Nepal	Inception Meeting		80,000	Planned for the launch of the project with country partners and stakeholders
WMO/NMHSs Bangladesh and Nepal	Advisory/steering committee meetings		80,000	An annual face-to-face meeting (20,000 USD each) with members of the project technical advisory committee.
	<b>Total</b>		<b>1,000,000</b>	

I. Include a disbursement schedule with time-bound milestones.

**Table 29: Project Disbursement Matrix**

	Upon signature of Agreement	One Year after Project Start a)	Year 2	Year 3	Total
Scheduled date	Jul-26	Jul-27	Jul-28	Jul-29	
Project Funds	2,750,000	3,650,000	3,500,000	1,100,000	11,000,000
Implementing Entity Fees	272,500	272,500	272,500	272,500	1,090,000
<b>Total</b>	<b>3,022,500</b>	<b>3,922,500</b>	<b>3,772,500</b>	<b>1,372,500</b>	<b>12,090,000</b>

a) Use projected start date to approximate first year disbursement

**PART IV: ENDORSEMENT BY GOVERNMENTS AND CERTIFICATION BY THE IMPLEMENTING ENTITY****A. Record of endorsement on behalf of the government<sup>53</sup>**

Provide the name and position of the government official and indicate date of endorsement for each country participating in the proposed project/programme. Add more lines as necessary. The endorsement letters should be attached as annexes to the project/programme proposal.

Ms. Farhina Ahmed Secretary Ministry of Environment, Forest and Climate Change	Date: July 20 2023
Mr. Suman Subedi Under Secretary (Technical), Head, Adaptation Section Climate Change Management Division Ministry of Forests and Environment	Date: June 16, 2025

**B. Implementing Entity certification**

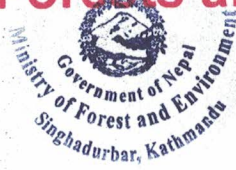
Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans and subject to the approval by the Adaptation Fund Board, <u>commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund</u> and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.	
<i>Moyenda Chaponda</i>	
Moyenda Chaponda Implementing Entity Coordinator Office for Resource Mobilization and Development Partnerships	
Date: 12 December 2025	Tel. and email: +41 22 730 8646 and mchaponda@wmo.int
Project Contact Person: Hwirin Kim	
Tel. And Email: +41 22 730 8358 and <a href="mailto:hkim@wmo.int">hkim@wmo.int</a>	

<sup>53</sup> Each Party shall designate and communicate to the secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.



Government of Nepal  
**Ministry of Forests and Environment**



P.O. Box No. 3987  
Singh Durbar, Kathmandu

Ref. No. 362

**Letter of Endorsement**

Date: 16<sup>th</sup> June 2025

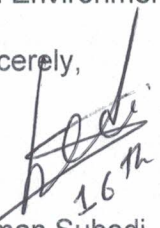
To: The Adaptation Fund Board  
c/o Adaptation Fund Board Secretariat  
Email: Secretariat@Adaptation-Fund.org  
Fax: 202 522 3240/5

**Subject: Endorsement for Hydrological Status and Outlook system for integrated water resources management and climate resilience in Bangladesh and Nepal (HydroSOS-BaNe) Project**

In my capacity as designated authority for the Adaptation Fund in Nepal, I confirm that the above regional project proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in Nepal.

Accordingly, I am pleased to endorse the above project proposal with support from the Adaptation Fund. If approved, the project will be implemented by World Meteorological Organization (WMO) and executed by World Meteorological Organization (WMO) and Department of Hydrology and Meteorology, Nepal in close co-ordination with Ministry of Forests and Environment, Nepal.

Sincerely,

  
16<sup>th</sup> June 2025

Suman Subedi  
Designated Authority, Adaptation Fund  
Under Secretary, Adaptation Section  
Ministry of Forests and Environment  
Email: s\_subedi2003@yahoo.com  
suman.subedi@nepal.gov.np



**Letter of Endorsement on behalf of the Government of Bangladesh**

Record No. 00.0000.067.019.17.part(1).155

Date: 20 July 2023

To: The Adaptation Fund Board  
c/o Adaptation Fund Board Secretariat  
Email: Secretariat@Adaptation-Fund.org  
Fax: 202 522 3240/5


Subject: Endorsement for Hydrological Status and Outlook system for integrated water resources management and climate resilience in Bangladesh and Nepal (HydroSOS-BaNe) project

In my capacity as designated authority for the Adaptation Fund in Bangladesh, I confirm that the above regional grant proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in Bangladesh and Nepal region.

Accordingly, I am pleased to endorse the above grant proposal with support from the Adaptation Fund. If approved, the project will be implemented by the World Meteorological Organization (WMO) and executed by the World Meteorological Organization (WMO), Bangladesh Meteorological Department (BMD), Bangladesh Water Development Board (BWDB), and Department of Hydrology and Meteorology of Nepal in close coordination with the climate change focal ministry in these two countries.

Justification to include WMO as an executing partner is provided below in the Annex 1.

Sincerely,

  
20.07.2023

Dr. Farhina Ahmed  
Secretary

Ministry of Environment, Forest and Climate Change  
and  
Designated authority for the Adaptation Fund in Bangladesh



**Annex 1: Request for Change in Project Execution Arrangements: HydroSOS Bane Project (Bangladesh and Nepal)**

To: The Adaptation Fund Board  
c/o Adaptation Fund Board Secretariat  
Email: Secretariat@Adaptation-Fund.org  
Fax: 202 522 3240/5

Record No.00.0000.067.019.17.part(1).155

Date: 20 July 2023

Subject: Agreement on the implementation of HydroSOS BaNE project by the WMO together with the Bangladesh Meteorological Department (BMD), Bangladesh Water Development Board (BWDB), and Department of Hydrology and Meteorology of Nepal

Dear Adaptation Fund Secretariat,

As the Designated Authority for Bangladesh. I would like to present my compliments to the Secretariat.

I am writing this letter to endorse the change requested by the Implementing and Executive Partners regarding the Executing Entities responsible for the implementation of the regional project " Hydrological Status and Outlook system for integrated water resources management and climate resilience in Bangladesh and Nepal (HydroSOS-BaNe) " that WMO is also executing the project in Bangladesh and Nepal.

The Designated Authority was informed about the need to officially submit an endorsement letter in order to formalize the change and to obtain the approval by the Project and Programme Review Committee (PPRC) and the Adaptation Fund Board, and would like to state that such change does not represent any inconvenience but represents, in fact, the best solution to ensure continuity and quality implementation of the project activities at the regional, national and local levels, considering the limited capacity (technical and human) of the Bangladesh Meteorological Department (BMD), Bangladesh Water Development Board (BWDB), and Department of Hydrology and Meteorology of Nepal to execute the activities at the national and regional level. Also, WMO being an United Nations specialized agency has several advantages such as VAT exemption during the procurement of goods and services, expertise and availability of technical tools and products etc. which will be instrumental in the execution of the project activities.

Sincerely,

Dr. Farhina Ahmed  
Secretary

Ministry of Environment, Forest and Climate Change  
and  
Designated authority for the Adaptation Fund in Bangladesh



Government of Nepal

# Ministry of Forests and Environment



Ref.No. 15

P.O. Box No.3987  
Singha Durbar, Kathmandu

Date:- 3<sup>rd</sup> August, 2023

To: The Adaptation Fund Board  
c/o Adaptation Fund Board Secretariat  
Email: Secretariat@Adaptation-Fund.org  
Fax: 202 522 3240/5

**Subject: Agreement on the implementation of HydroSOS BaNE project by the WMO together with the Bangladesh Meteorological Department (BMD), Bangladesh Water Development Board (BWDB), and Department of Hydrology and Meteorology of Nepal**

Dear Adaptation Fund Secretariat,

As the Designated Authority for Nepal. I would like to present my compliments to the Secretariat.

I am writing this letter to endorse the change requested by the Implementing and Executive Partners regarding the Executing Entities responsible for the implementation of the regional project " **Hydrological Status and Outlook system for integrated water resources management and climate resilience in Bangladesh and Nepal (HydroSOS-BaNe)** " that WMO is also executing the project in Bangladesh and Nepal.

The Designated Authority was informed about the need to officially submit an endorsement letter in order to formalize the change and to obtain the approval by the Project and Programme Review Committee (PPRC) and the Adaptation Fund Board, and would like to state that such change does not represent any inconvenience but represents, in fact, the best solution to ensure continuity and quality implementation of the project activities at the regional, national and local levels, considering the limited capacity of the Bangladesh Meteorological Department (BMD), Bangladesh Water Development Board (BWDB), and Department of Hydrology and Meteorology of Nepal to execute the activities at the national and regional level. Also, WMO being a United Nations specialized agency has several advantages such as VAT exemption during the procurement of goods and services, expertise and availability of technical tools and products etc. which will be instrumental in the execution of the project activities.

I trust that you will look on this endorsement favorably.

Sincerely,

Mr. Yam Nath Pokharel

**Designated Authority, Adaptation Fund**

Position: Under Secretary (Technical)

Head, Adaptation Section

Climate Change Management Division

Ministry of Forests and Environment, Government of Nepal

Singhadurbar, Kathmandu, Nepal

Tel: +977 14211996, Mobile: +977-9851112634

Email: [ynpokharel@gmail.com](mailto:ynpokharel@gmail.com)

Web: <https://mofe.gov.np/>



**Annex 1: Request for Change in Project Execution Arrangements: HydroSOS Bane Project  
(Bangladesh and Nepal)**

To: The Adaptation Fund Board  
c/o Adaptation Fund Board Secretariat  
Email: Secretariat@Adaptation-Fund.org  
Fax: 202 522 3240/5

Record No.00.0000.067.019.17.part(1)-155

Date: 20 July 2023

Subject: Agreement on the implementation of HydroSOS BaNE project by the WMO together with the Bangladesh Meteorological Department (BMD), Bangladesh Water Development Board (BWDB), and Department of Hydrology and Meteorology of Nepal

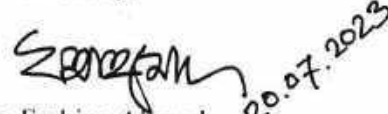
Dear Adaptation Fund Secretariat,

As the Designated Authority for Bangladesh. I would like to present my compliments to the Secretariat.

I am writing this letter to endorse the change requested by the Implementing and Executive Partners regarding the Executing Entities responsible for the implementation of the regional project " Hydrological Status and Outlook system for integrated water resources management and climate resilience in Bangladesh and Nepal (HydroSOS-BaNe) " that WMO is also executing the project in Bangladesh and Nepal.

The Designated Authority was informed about the need to officially submit an endorsement letter in order to formalize the change and to obtain the approval by the Project and Programme Review Committee (PPRC) and the Adaptation Fund Board, and would like to state that such change does not represent any inconvenience but represents, in fact, the best solution to ensure continuity and quality implementation of the project activities at the regional, national and local levels, considering the limited capacity (technical and human) of the Bangladesh Meteorological Department (BMD), Bangladesh Water Development Board (BWDB), and Department of Hydrology and Meteorology of Nepal to execute the activities at the national and regional level. Also, WMO being an United Nations specialized agency has several advantages such as VAT exemption during the procurement of goods and services, expertise and availability of technical tools and products etc. which will be instrumental in the execution of the project activities.

Sincerely,



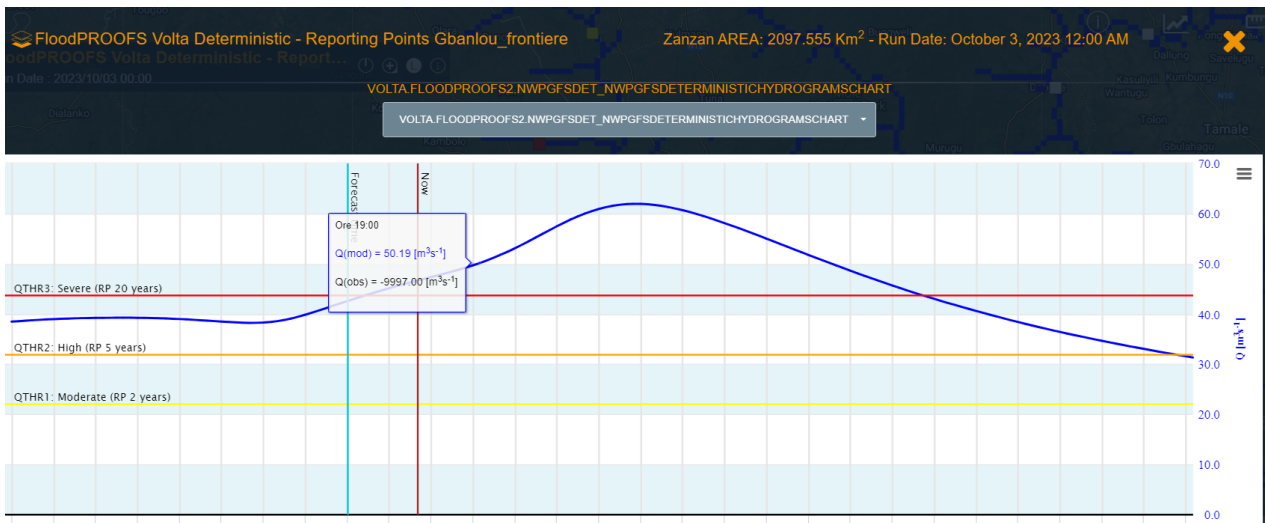
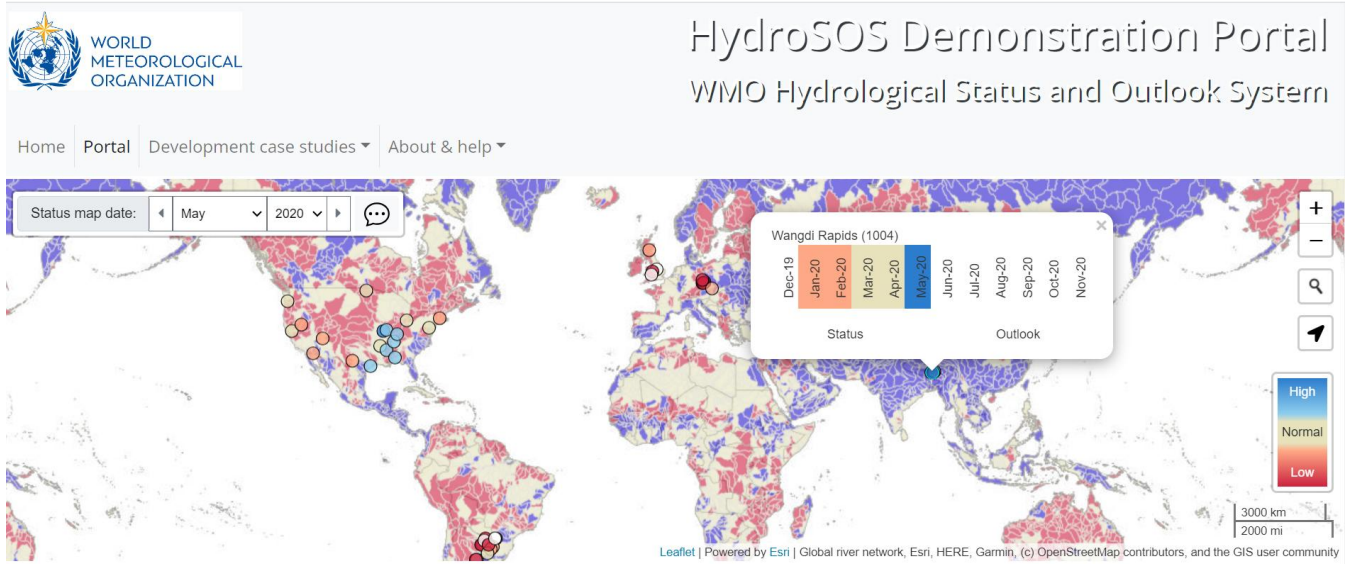
Dr. Farhina Ahmed  
Secretary

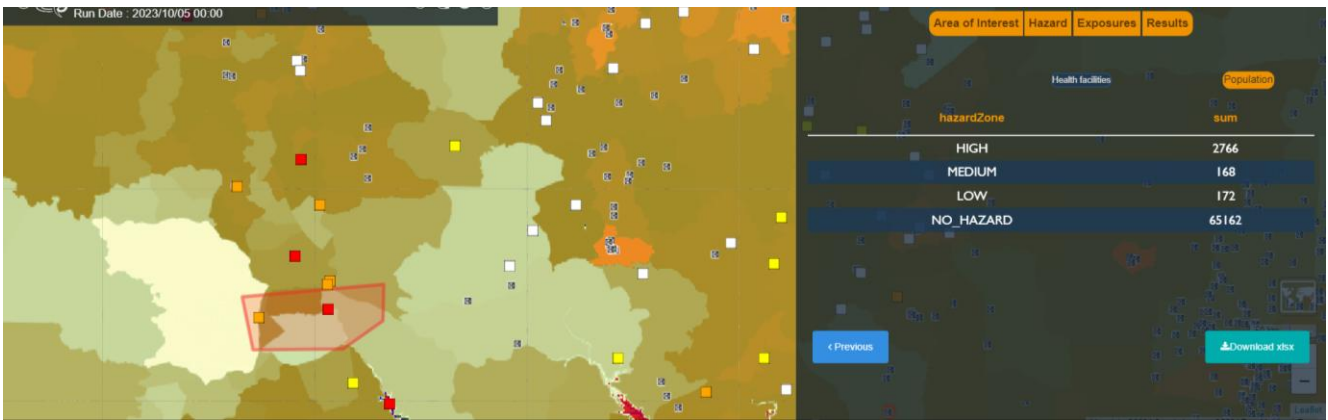
Ministry of Environment, Forest and Climate Change  
and

Designated authority for the Adaptation Fund in Bangladesh

## Annexes

**Annex 1: prototype screenshot for HydroSOS Global demonstrator products as a demonstration of EWS end products under the HydroSOS-BaNe project : <https://eip.ceh.ac.uk/hydrology/HydroSOS/portal/> co-designed and developed with the national and regional stakeholders**





**Annex 2: Community consultation (Vulnerable, Marginalized, and Minority including women groups) survey response sheets and consultation workshop reports**

**Community consultation reports and National and Regional Consultation workshops between the executing partners, national agencies, and regional entity of the HydroSOS-BaNe project carried out in 2022 and 2024**

[community consultation report - Bangladesh.pdf](#)

[community consultation report - Nepal WMO.pdf](#)

[2024-10-05 Report Community Visit Kathmandu BaNe Mission.pdf](#) organized in October 2024

[National workshop - Nepal WMO.pdf](#) organized in 2022

[National workshop report-Bangladesh WMO.pdf](#) organized in 2022

[Regional workshop report-HydroSOS-BaNe project preparation.pdf](#) organized in June 2023

[HydroSOS-BaNe regional workshop report - 26-28 June 2024.pdf](#) organized in June 2024

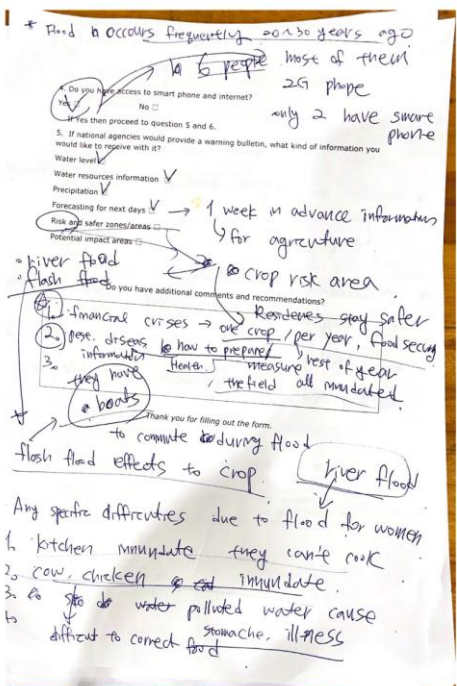
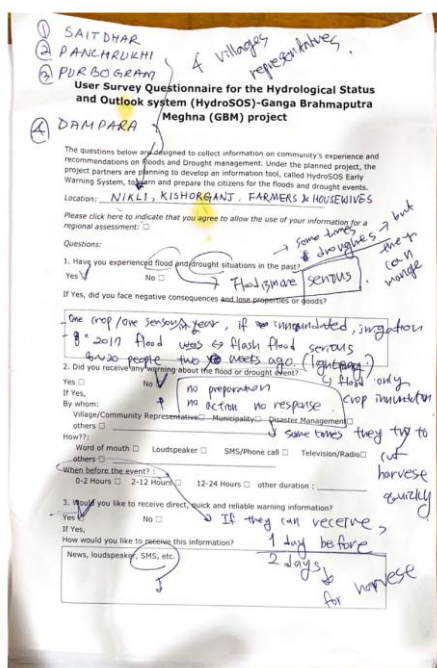
[2024-10 Report Meetings Nepal HydroSOS-BaNe Mission.pdf](#) organized in October 2024

[2024-10 Report Meetings Bangladesh HydroSOS-BaNe Mission.pdf](#) organized in October 2024

**User requirements collected from the national agencies of Bangladesh and Nepal to understand their requirements from the HydroSOS EWS project**

[https://wmoimm.sharepoint.com/sites/Services/Shared%20Documents/SS\\_Hydrology%20and%20Water%20Resource%20APFM/13.%20other%20info/GBM-AF/Consultation%20meetings%20report/User%20requirements%20from%20the%20National%20and%20Regional%20agencies%20of%20BaNe%20countries/User%20requirements%20from%20the%20national%20and%20regional%20agencies%20of%20the%20GBM%20countries.pdf?CT=1731505173511&OR=ItemsView](https://wmoimm.sharepoint.com/sites/Services/Shared%20Documents/SS_Hydrology%20and%20Water%20Resource%20APFM/13.%20other%20info/GBM-AF/Consultation%20meetings%20report/User%20requirements%20from%20the%20National%20and%20Regional%20agencies%20of%20BaNe%20countries/User%20requirements%20from%20the%20national%20and%20regional%20agencies%20of%20the%20GBM%20countries.pdf?CT=1731505173511&OR=ItemsView)

**Below is the questionnaire filled out during the community consultation**



**User Survey Questionnaire for the Hydrological Status and Outlook system (HydroSOS)-Ganga Brahmaputra Meghna (GBM) project**

The questions below are designed to collect information on community's experience and recommendations on Floods and Drought management. Under the planned project, the project partners are planning to develop an information tool, called HydroSOS Early Warning System, to warn and prepare the citizens for the floods and drought events.

Location: \_\_\_\_\_

Please click here to indicate that you agree to allow the use of your information for a regional assessment:

Questions:

1. Have you experienced flood and drought situations in the past? - last month - flood flood  
 Yes  (not responding to drought as it's slow)  No  *mostly in 2017, biggest flood.*

If Yes, did you face negative consequences and lose properties or goods?

*one crop season only available, they lose it due to the floods. This year 8-10 people lost their lives due to pre-monsoon harvesting of crops because difficult lightning*

2. Did you receive any warning about the flood or drought event?

Yes  No

If Yes, by whom:

Village/Community Representative  Municipality  Disaster Management  others

How??:

Word of mouth  Loudspeaker  SMS/Phone call  Television/Radio  others

When before the event? :

0-2 Hours  2-12 Hours  12-24 Hours  other duration: \_\_\_\_\_

3. Would you like to receive direct, quick and reliable warning information? *to take necessary precaution*

Yes  No

If Yes,

How would you like to receive this information?

News, loudspeaker, SMS, etc.

*10 people out of 16 have mobile phone.*

*gender related issues are not present*

*Water development board Agriculture Dept coordinate with the community on the preparedness*

4. Do you have access to smart phone and internet?

Yes  only 2 person out of 16  No

If Yes then proceed to question 5 and 6.

5. If national agencies would provide a warning bulletin, what kind of information you would like to receive with it?

Water level

Water resources information

Precipitation

Forecasting for next days *one week in advance*

Risk and safer zones/areas

Potential impact areas

*Do you have additional comments and recommendations?*

*children - cannot cook during flood as houses are inundated collect food for the cattle. Diarrhoea - water borne disease increases Availability 6 months they use the boat*

*ambition*

Thank you for filling out the form.

*lose one cropping, If will lead to non-availability of foods*

*pesticides information.*

*more floods are happening in last 20 years*

*submerge roads are present*

*Embankments construction has improved construction of house school based shelters*

**Attendance sheet of the participants**

Name	Male/Female	Occupation	Signature
1. AKRASH MITA	MALE	Farmer, Palkopuram	<i>[Signature]</i>
2. SUN MURSHAD	"	"	<i>[Signature]</i>
3. DULAL	"	"	<i>[Signature]</i>
4. ALEM ALI	"	"	<i>[Signature]</i>
5. DULAL MITA	FEMALE	Farmer	<i>[Signature]</i>
6. JABER HASSAN	"	"	<i>[Signature]</i>

Participants Attendance sheet

Country name: Bangladesh

Name of the community: Panch village, Kisharganj

Community consultation for the Hydrological Status and Outlook System (HydroSOS) in the Ganga Brahmaputra Meghna (GBM) project

Name	Male/Female	Occupation	Signature
7. BADRULLAMON	MALE	FARMER	<i>[Signature]</i>
8. NOMEZA BEGUM	FEMALE	HOUSEwife	<i>[Signature]</i>
9. RASHIDA KHATUN	"	"	<i>[Signature]</i>
10. AHMED NURARA	"	"	<i>[Signature]</i>
11. RUIYIN	"	"	<i>[Signature]</i>
12. REETA BANU	"	"	<i>[Signature]</i>
13. Rokeya Begum	"	"	<i>[Signature]</i>
14. HELENA	"	"	<i>[Signature]</i>
15. RANSTONARRA	"	"	<i>[Signature]</i>
16. AKLIMA	"	"	<i>[Signature]</i>



*\* drought : 2 years ago 2019 May  
huge drought, low flow, not every year*

### User Survey Questionnaire for the Hydrological Status and Outlook system (HydroSOS)-Ganga Brahmaputra Meghna (GBM) project

*b but flood occur every year*

The questions below are designed to collect information on community's experience and recommendations on Floods and Drought management. Under the planned project, the project partners are planning to develop an information tool, called HydroSOS Early Warning System, to warn and prepare the citizens about the flood and drought events.

Location: Sipahdaha, Nepal

Please click here to indicate that you agree to allow the use of your information for a regional assessment:

Questions:

1. Have you experienced flood and drought situations in the past? *last worse huge during April*  
 Yes  No

If Yes, did you face negative consequences and lose properties or goods?  
 *house was no land agricultural damage*

2. Did you receive any warning about the flood or drought event?  
 Yes  No   
 If Yes, By whom: *phone call upstream no human casualty*  
 Village/Community Representative  Municipality  Disaster Management   
 others  *SMS*

How?:  
 Word of mouth  Loudspeaker  SMS/Phone call  Television/Radio   
 others

When before the event?:  
 0-2 Hours  2-12 Hours  12-24 Hours  other duration: \_\_\_\_\_

3. Would you like to receive direct, quick and reliable warning information?  
 Yes  No   
 If Yes, How would you like to receive this information?  
 News, loudspeaker, SMS, etc.  *SMS is enough*

*\* more residents more houses* → *can be more damages higher level for house build*

4. Do you have access to smart phone and internet?  
 Yes  No   
 If Yes then proceed to question 5 and 6.

5. If national agencies would provide a warning bulletin, what kind of information you would like to receive with it?  
 Water level   
 Water resources information   
 Precipitation   
 Forecasting for next days   
 Risk and safer zones/areas   
 Potential impact areas

*They can know + shelter + evacuate way.*

Do you have additional comments and recommendations?  
 *embankment is to standard*  
 *request precipitation forecasting information*  
 Thank you for filling out the form.  
 *send SMS 2-3 hours before in advance*  
 *They need one night for old people, children.*  
 *10-15 years flood. debris*  
 *they were not inundated in distance*

### User Survey Questionnaire for the Hydrological Status and Outlook system (HydroSOS)-Ganga Brahmaputra Meghna (GBM) project

The questions below are designed to collect information on community's experience and recommendations on Floods and Drought management. Under the planned project, the project partners are planning to develop an information tool, called HydroSOS Early Warning System, to warn and prepare the citizens about the flood and drought events.

Location: Melmarchi, Baran

Please click here to indicate that you agree to allow the use of your information for a regional assessment:

Questions:

1. Have you experienced flood and drought situations in the past?  
 Yes  No  *(flood in 2011)*

If Yes, did you face negative consequences and lose properties or goods?

*Damage to house & household materials washed away shop was damaged. livelihood impact*

2. Did you receive any warning about the flood or drought event?

Yes  No

If Yes,

By whom:

Village/Community Representative  Municipality  Disaster Management   
 others  *Timko Village (upstream 13 km) gave them*

How?:

Word of mouth  Loudspeaker  SMS/Phone call  Television/Radio   
 others

When before the event? :

0-2 Hours  2-12 Hours  12-24 Hours  other duration: \_\_\_\_\_

3. Would you like to receive direct, quick and reliable warning information?

Yes  No

If Yes,

How would you like to receive this information?

News, loudspeaker, SMS, etc.  *phone call*

4. Do you have access to smart phone and internet?

Yes  No

If Yes then proceed to question 5 and 6.

5. If national agencies would provide a warning bulletin, what kind of information you would like to receive with it?

Water level

Water resources information

Precipitation

Forecasting for next days

Risk and safer zones/areas

Potential impact areas

Do you have additional comments and recommendations?

*They never imagined these kinds of flood situation Evacuation place (Red cross provided Tent) Loudspeaker/siren will be important*

Thank you for filling out the form.

National Consultation on Hydrological Status and Outlook Systems for IWRM and Climate Resilience in the GBM Basin  
17 May, 2022

community consultation  
The Everest Hotel, Baneshwor, Kathmandu

## Registration

S.N	Name	Institution	M/F	Signature
1	Tika Bahadur Sapkota	Sipapokhure, Shindupalchok	M.	
2	Pukia Shrestha	Sipaghat, Kavre.	F.	
3	Rajendra Danwar	Sipaghat, Kavre.	M.	
4	B Dambar Bahadur Shrestha	Sipaghat, Kavre.	M.	
5	Katana Shrestha	Sipaghat, Kavre.	F.	
6	Bel Bahadur Shrestha	Sipaghat, Kavre.	M.	
7	Sunita Tamang	Sipaghat, Kavre.	F.	
8	Trihamaya Tamang	Sipaghat, Kavre.	F.	
9	Dal Bahadur Danwar	Sipaghat, Kavre.	M.	
10	Ranumaya Shrestha	Sipaghat, Kavre.	F.	
11	Rambabu Majhi	Bhotar, Gndrawati, ward-12	M.	
12	Sony Tamang	Devamundan, Sipaghat.	F.	
13	Ram Kumari Shrestha	Sipaghat,		
14	Sharita Shrestha	Sipaghat, Kavre.		

**Annex 3: Environmental and Social Impact Assessment (ESIA) Report and Environmental and Social Management Plan (ESMP)**

**REPORT ON ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT**

**HYDROLOGICAL STATUS AND OUTLOOK SYSTEM FOR INTEGRATED WATER RESOURCES MANAGEMENT AND CLIMATE RESILIENCE IN BANGLADESH AND NEPAL (HYDROSOS-BANE) PROJECT**

**ESIA REPORT**

**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT AND THE DEVELOPMENT OF ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN IN THE FRAMEWORK OF THE HYDROSOS-BANE PROJECT SUBMITTED FOR FUNDING TO THE ADAPTATION FUND**

**15 August 2024**



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## Acronym

AF	Adaptation Fund
BMD	Bangladesh Meteorological Department
BWDB	Bangladesh Water Development Board and Flood
DDM	Department of Disaster Management, Bangladesh
DHM	Department of Hydrology and Meteorology, Nepal
ESMP	Environmental and Social Management Plan
EIA	Environmental Impact Assessment
ESP	Environmental and Social Policy
EPR	Environmental Protection Regulations
FFWC	Forecasting and Warning Centre, Bangladesh
MOHA	Ministry of Home Affairs, Nepal
NHMSS	National Meteorological and Hydrological Services
SIA	Social Impact Assessment
WMO	World Meteorological Organization

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Table 11	Environmental and social context and basic conditions
Table 12	Potential Environmental Impacts and Mitigation Measure
Table 13	Institutions involved in the implementation of the ESMP

## 1. Introduction

### 1.1 Country Background: Bangladesh

Bangladesh is the eighth most populous country in the world, with a population of approximately 169.8 million spread over an area of 148,460 square kilometers according to the 2022 census. The country lies between the Himalayas and the Bay of Bengal, featuring gently sloping land that meets the bay at its southern end. Bangladesh is highly vulnerable to natural disasters, particularly floods and droughts, which cause significant socio-economic and environmental challenges. The country's geographical location contributes to its susceptibility to extreme events, resulting in damage to infrastructure, reduced agricultural productivity, and increased human insecurity. The north-western region of Bangladesh frequently experiences floods that shape the environment and pose severe challenges.

The Dry Season (Nov-Mar) is hot and sunny, with highs around 30°C (86°F), and occasional rain in November. The winter (Dec-Jan) brings in warm days, cool nights, and inland fog. Highs below 20°C (68°F), with night lows 3-6°C (37-43°F) in the north, 10°C (50°F) in the south. Spring (Mar-May) is the hottest season, with maximum temperatures 35°C (95°F) inland, 32-33°C (90-91°F) coast. Peaks up to 42-43°C (108-109°F) in the north. High humidity, thunderstorms, rainfall up to 250mm (10 in) in May.

The Monsoon (Jun-Oct) starts late May/early June, heavy rains, high humidity, daytime highs 30-32°C (86-90°F). Rainfall peaks 800mm (31.5 in) in Sylhet, 1000mm (40 in) in Teknaf. Less intense in the west, annual rainfall 1500-1600mm (60-63 in)<sup>54</sup>.

The north-western region of Bangladesh frequently experiences floods that shape the environment and pose severe challenges. These floods cause soil erosion, habitat loss, and ecosystems disruption, affecting wildlife and fisheries. Contaminated water sources foster waterborne diseases and displace communities. Managing floods requires balancing their benefits for sustainable development and mitigating adverse impacts.

The western Barind Tract region in mid-western Bangladesh faces semi-arid conditions with low rainfall, resulting in drought. Extended dry spells in the pre-monsoon and post-monsoon seasons lead to water scarcity, soil degradation, reduced agricultural productivity, and biodiversity loss. Inadequate water management infrastructure exacerbates these impacts, leading to water stress and socio-economic disparities.

### 1.2 Country Background: Nepal

Nepal, a landlocked mountainous nation, is strategically situated between India to the south, east, and west, and China to the north. The country is divided into five distinct physiographic regions running east to west: Terai, Siwalik (Churia), Middle Mountains, High Mountains, and High Himal<sup>55</sup>. This geographical diversity ranges from lowlands in



Figure 1: Physiographical map of Bangladesh

<sup>54</sup> (Source: World Climate guide, <https://www.climatestotravel.com/climate/bangladesh>)

<sup>55</sup> Nepal's Third National Communication to The United Nations Framework Convention on Climate Change, Government of Nepal, Ministry of Forests and Environment, 2021

the south, less than 60 meters above sea level, to the towering peaks of the Himalayas, including Mount Everest at 8,848 meters, along with eight other mountains exceeding 8,000 meters and over 200 peaks above 6,400 meters, all within a span of just 200 Km<sup>56</sup>. The geographical map of Nepal is showed below.

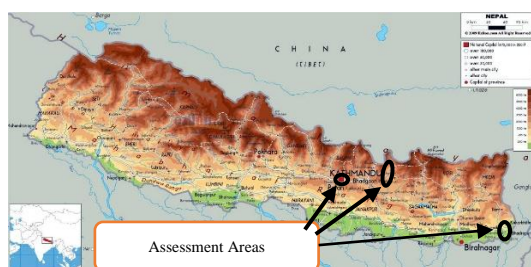


Figure 2: Physiographical map of Nepal

Source: Climate Change Knowledge Portal, World Bank<sup>57</sup>

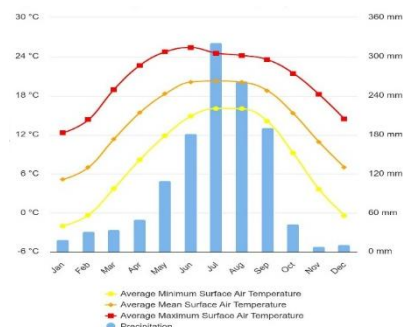


Figure 3: Average monthly climatology for mean surface temperature and precipitation from 1991 to 2022

In Nepal, the average annual maximum temperature has been increasing by 0.056°C/year and the minimum by 0.002°C/year. The minimum temperature is decreasing in mountainous districts such as Humla and Manang, but rising in the central Terai and Middle Mountainous regions. On the other side the average annual precipitation has declined by 1.3 mm per year over the period of 1971-2014<sup>58</sup>. Rapid changes in temperature and precipitation are significantly impacting forests, biodiversity, water resources, food production, and livelihoods. These extreme variations pose substantial risks to growth and distribution in these areas<sup>59</sup>.

Water and forests are Nepal's most abundant natural resources, with freshwater (derived from glaciers, snow, and rainfall) accounting for an estimated 2.27% of the world's total supply<sup>60</sup>. This water feeds the country's major rivers: Koshi, Gandaki, and Karnali. Together, these river systems supply freshwater to a large portion of the 500 million people who live in the Ganges River basin<sup>61</sup>. Small-scale, subsistence agriculture is a mainstay of Nepal's economy, employing 69% of the country's workforce in 2015. Despite this, agriculture contributed only 25% to GDP in 2019, compared with a 60% contribution from the service sector. Furthermore Nepal's vulnerability to climate change impacts and recent studies shows that Nepal will face loss 2.2% of annual GDP due to climate change by 2050<sup>62</sup>.

In the future, the rise in maximum and minimum temperatures is expected to be more pronounced than the average temperature increase, intensifying pressure on human health, livelihoods, and ecosystems. Temperature increases will be strongest during winter, glaciers are melting rapidly, and extreme precipitation events are becoming more frequent. These changes heighten the vulnerability of Nepal's communities, especially those in poverty and reliant on subsistence agriculture. As climate change impacts become more severe, Nepal must pursue sustainable, inclusive, and resilient growth. The country's achievements in community forestry and hydropower provide a strong foundation for future climate-smart development<sup>63</sup>.

Nepal faces significant vulnerability to climate change, experiencing an increasing incidence of landslides, flash floods, extreme heat, and droughts. Ranked as the tenth most affected country globally by the Long-Term Climate Risk Index<sup>64</sup>, about 80% of Nepal's population is exposed to climate-induced hazards such as floods, landslides, heat stress, and drought<sup>65</sup>. The country's high susceptibility to the adverse effects of climate change stems from its diverse topography, fragile geological structures, sensitive ecosystems, and varied climate and microclimate zones. Additionally, poverty, social disparities, and heavy reliance on natural resources for livelihoods exacerbate Nepal's sensitivity to climate impacts<sup>66</sup>. Floods and landslides are the most common hazards, with their frequency having doubled in recent years<sup>67</sup>.

The Government of Nepal (GoN) is committed to achieving the Sustainable Development Goals (SDGs) and fulfilling international pledges for climate-resilient, inclusive, and sustainable development by 2030. In line with the Paris Agreement, the GoN aims to combat climate change and achieve socio-economic prosperity through a climate-resilient

<sup>56</sup> Nepal Geography, <https://www.countryreports.org/country/Nepal/geography.htm>, May 4, 2024

<sup>57</sup> Climate Change Knowledge Portal, World Bank Group, <https://climateknowledgeportal.worldbank.org/country/nepal/climate-data-historical>, May 4 2024

<sup>58</sup> Vulnerability and Risk Assessment and Identifying Adaptation Options: Summary for Policy Makers, MoFE, GoN, 2021

<sup>59</sup> Vulnerability and Risk Assessment and Identifying Adaptation Options Sectoral Report Forests, Biodiversity, and Watershed Management, MoFE, GoN, 2021

<sup>60</sup> Country Environment Note Nepal, Asian Development Bank, 2014

<sup>61</sup> Climate Risk Country Profile: Nepal (2021): The World Bank Group and the Asian Development Bank.

<sup>62</sup> Climate Change Knowledge Portal, World Bank Group, <https://climateknowledgeportal.worldbank.org/country/nepal>, May 4 2024

<sup>63</sup> Country Climate and Development Report Nepal, The World Bank Group, 2022.

<sup>64</sup> Eckstein, D., Künzel, V., Schäfer, L., 2021. GLOBAL CLIMATE RISK INDEX 2021: Who Suffers Most from Extreme Weather Events? Weather-Related Loss Events in 2019 and 2000–2019. Germanwatch, Berlin. Retrieved from [https://www.germanwatch.org/sites/default/files/Global%20Climate%20Risk%20Index%202021\\_2.pdf](https://www.germanwatch.org/sites/default/files/Global%20Climate%20Risk%20Index%202021_2.pdf).

<sup>65</sup> MoHA, 2018. Nepal Disaster Report 2017: The Road to Sendai. Ministry of Home Affairs, GoN, Kathmandu.

<sup>66</sup> Government of Nepal, 2019. National Climate Change Policy, 2076 (2019)

<sup>67</sup> Country Climate and Development Report Nepal. The World Bank Group, 2022.

society. The UN system in Nepal, in collaboration with the GoN, has developed the UN Sustainable Development Cooperation Framework (UNSDCF) for 2023-2027, aligning with the SDGs and national priorities.

Localized hazards in Nepal necessitate tailored risk management strategies. Implementing an effective Early Warning System (EWS) is crucial to mitigate climate change impacts, especially for agriculture and natural-resource-based livelihoods. Strengthening technical and functional capacities, upgrading disaster management information systems, and enhancing hazard and risk mapping are essential. An integrated EWS will support timely community preparedness, response, and recovery, reducing losses and fostering resilience. Improved coordination among federal, provincial, and local stakeholders is vital for embedding forecasts and early warnings into decision-making, enhancing Nepal's disaster resilience.

### 1.3. Initial State of the Socioeconomic

#### 1.3.1 Initial state of the socioeconomic condition in Bangladesh

Floods and droughts in these regions result from a combination of natural and anthropogenic factors, including seasonal variability, climate change, and unsustainable water management practices. Understanding the existing environment of flood and drought is essential for developing adaptive strategies and ensuring sustainable resource management. This description provides a detailed overview of the geographical features, climate patterns, ecosystems, and the socio-economic implications of flood and drought. The description of existing environment is mentioned below:

##### **Flood Prone Kurigram District**

Kurigram, in northern Bangladesh, has flat terrain with fertile soils from the Teesta, Dharla, and Brahmaputra rivers. The tropical monsoon climate brings warm, humid summers and cool, dry winters. Monsoon flooding causes significant crops and infrastructure damage. Rivers are crucial for irrigation, transport, and fishing, with arsenic-free groundwater accessed via tube wells. The district faces widespread poverty, with many relying on agriculture and fishing. Seasonal floods exacerbate economic challenges, causing displacement and income loss. Small industries like rice mills, jute processing, and handicrafts support the local economy. Tribal communities, including the Santal, Oraon, and Munda, rely on agriculture, fishing, and crafts. Key crops are rice, jute, and maize, with wetlands attracting migratory birds.

##### **Drought Prone Rajshahi District**

Rajshahi, in the Barind Tract, has fertile soils from the Ganges and tributaries. It features a tropical wet and dry climate, with hot summers and monsoon rains from June to September. Key rivers like the Padma, Mahananda, and Baral support irrigation, fishing, and transport. Groundwater, vital for agriculture, faces some arsenic contamination. Rainwater harvesting aids dry season water supply. Low salinity and occasional flooding affect the area. Air quality suffers from agricultural activities and brick kilns. Flora includes Sal, Neem, and Mango trees; fauna includes Bengal foxes, jackals, and various birds and reptiles. Tribal groups like the Santal, Oraon, and Paharia add cultural diversity. The economy is diverse, with agriculture, textile mills, brick kilns, and small industries.

#### 1.3.2 Initial state of the socioeconomic condition in Nepal

The total population of Nepal, as of the census day (25 November 2021) is 29,164,578, of which 48.87 % are male and 51.13 % are Female. There is a total of 2,928 individuals (0.01 percent of the total population) reported as 'other gender' (sexual and gender minorities). The 2021 census results show that 3.88 % of the total households do not have any of the household assets/amenities and 2.2 % of the total population have one or the other type of disability. The literacy rate of the country's total population aged 5 years and above is 76.2 %. Of the total 24 Million population aged 10 years or above, 65.5% persons are economically active. Among the economically active population, the highest share of people (50.1 %) is engaged in agriculture, forestry and fishery skilled 68workers.<sup>68</sup>

Nepal has established a very good network of Protected Areas system with 12 National Parks, 1 Wildlife Reserve, 1 Hunting Reserve, 6 Conservation Areas, and 13 Buffer Zones extending from lowland Terai to high mountains, covering 23.39 % of the total country's land, which contribute to in-situ conservation of ecosystems and biodiversity across the country.<sup>69</sup>

##### **Initial state of West Rapti**

The West Rapti River basin is situated in the mid-western region of Nepal. The river originates in Nepal's middle mountains, flows into the lowlands, and ultimately drains into the Ghagra (Karnali) River, a tributary of the Ganges River in India. It has several tributaries, with the major ones being the Jhimruk River, Mari River, Arun River, Lungri River, Sit River, Dunduwa River, Sotiya, and Gandheli rivulets. The runoff in the basin is primarily due to monsoon rainfall and groundwater. The upper West Rapti River basin experiences a temperate climate, while the lower basin, including the Banke district, has a tropical to subtropical climate<sup>70</sup>. The primary agricultural activities in this region

<sup>68</sup> [https://censusnepal.cbs.gov.np/results/files/result-folder/National%20Report\\_English.pdf](https://censusnepal.cbs.gov.np/results/files/result-folder/National%20Report_English.pdf)

<sup>69</sup> <https://dnpwc.gov.np/en/>

<sup>70</sup> Gautam, D. K., & Phajju, A. G. (2013). Community based approach to flood early warning in West Rapti River Basin of Nepal. *Journal of Integrated Disaster Risk Management*, 3(1), 155-169.

include rice and maize production. Farmers rely on mulberry, citrus, and Asian pear as cash crops. In the highlands of the West Rapti region, they herd sheep, goats, and cattle. The major population groups are Bahun, Chettri, Newar, and Magar.<sup>71</sup>

The West Rapti River in Nepal is one of the most flood-prone rivers in the region. The villages most affected by this are Betahani, Holiya, Binauna, and Phatepur in the Banke District. Major problems affecting the lives and livelihoods of people living in the lower West Rapti River basin include sediment deposition in farmland from torrents originating in the Chure/Siwalik range, flooding-induced inundation, and bank erosion at various locations due to rapid geomorphological changes<sup>72</sup>.

#### **Initial state of Kankai River**

The Kankai River, a trans-boundary river in eastern Nepal, flows through the hills of Ilam and the plains of the Jhapa District, bordering India. Originating at the confluence of the Mai Khola and Deb Mai Khola rivers, the upper Kankai basin has a sub-tropical and temperate climate, while the lower basin experiences a tropical climate. The hilly upper basin features steep terrain, and the river's braided form leads to significant flooding impacts, inundating vast downstream floodplain regions during high flood levels<sup>73</sup>. Farmers in this region are increasingly adopting multi-year cropping practices, cultivating crops such as Amriso, banana, supari (areca nut), tea, and coffee. Despite these efforts, erosion and sedimentation processes remain active. Erosion and landslides in the uphill areas exacerbate the debris run-out process, often creating large debris fans that cause significant damage and loss across the foothills of Chure. The expansion of settlements and tourism activities in and around these debris fans has heightened vulnerability<sup>74</sup>.

#### **Initial State of Bagmati River Basin**

The Bagmati River, located in central Nepal, originates from Bagdwar at an altitude of 2690 meters and flows south through the Kathmandu Valley. Its basin covers an area of 3750 square kilometers and includes parts of eight districts: Kathmandu, Lalitpur, Bhaktapur, Makwanpur, Kavre, Sindhuli, Rautahat, and Sarlahi. Flooding along the Bagmati River is common during the monsoon season. Residents of the Kathmandu Valley rely on the monsoon rains and the resulting floods for rice cultivation<sup>75</sup>. Some villages considered to be at very high flood risk include Khairwa, Arnaha, Mahinathpur, Auraiya, Bairiya, Gangapipra, Inarbari, Jowaha, Katahariya, Laxmipur, Maryadpur, Mathiya, Bhediya, Pipra Bhagwanpur, Rajdevi, Rajpur, Sarmujawa, and Masedawa.<sup>76</sup> Farmers in the Bagmati River Basin (BRB) cultivate vegetables such as potatoes, pumpkin stems, smooth gourds, cucumbers, along with maize and rice.

#### **Initial State of Tinau River**

The Tinau River, located in Nepal, originates in the Mahabharat Range and is not snow-fed. Flowing through the Palpa and Rupandehi districts, it frequently floods the Terai plains, causing significant damage. Unlike major Himalayan rivers, Tinau's floods are driven by cloudbursts in Palpa and landslides upstream of Butwal. The Marchawar area in southern Rupandehi, near the Indian border, often experiences inundation due to increased river flow and water backflow during peak periods<sup>77</sup>. Paddy, maize, and wheat are the main food crops, while ginger, vegetables, and fruits are also considered cash crops<sup>78</sup>.

#### **Initial state of Tamakoshi River Basin**

The Tamakoshi River Basin features two types of elevation relief: the high Himalayas and the lesser Himalayas. The Tamakoshi River is the main watercourse, joined by 72 feeder streams within the basin.<sup>79</sup>

In August 2013, heavy rainfall in Bhirkot (Dolakha) triggered a flash flood in the Guiye River and Adhnari Khola, blocking the Pushpalan Highway for about a week.<sup>80</sup> Agricultural practices are primarily focused on subsistence production of rice, wheat, maize and millet farming<sup>81</sup>.

## **2. Project Background**

The Hydrological Status and Outlook System for Integrated Water Resources Management and Climate Resilience in Bangladesh and Nepal (HydroSOS-BaNe) project aims to enhance climate adaptive capacities and resilience against hydro-climatic risks in Bangladesh and Nepal. These countries encompass a significant portion of the Ganga Brahmaputra Meghna (GBM) River Basin, which spans 1.7 million square kilometers and supports over 500 million people. The project's necessity was identified through national stakeholder consultations conducted by the World Meteorological Organization (WMO) from 2019 to 2020. HydroSOS-BaNe intends to develop a cutting-edge, tailored Regional Hydro-Meteorological Early Warning System providing short-term and seasonal forecasts, integrated within a Long-term Water Resource Information System. This initiative aligns with the Adaptation Fund's goal to reduce

<sup>71</sup> [https://en.wikipedia.org/wiki/Rapti\\_Zone](https://en.wikipedia.org/wiki/Rapti_Zone)

<sup>72</sup> Talchabhadel, R., & Sharma, R. (2014). Real time data analysis of west Rapti River Basin of Nepal. *Journal of Geoscience and Environment Protection*, 2(05), 1-7.

<sup>73</sup> Pudasaini, S., Gautam, N. P., & Shrestha, A. (2023). Flood Risk Mapping of Kankai Basin: A Case Study of Shivasatakshi Municipality and Kankai Municipality. *Kathford Journal of Engineering and Management*, 2(01), 106-121.

<sup>74</sup> [https://brcn.gov.np/publication/6.CERP\\_Kankai.pdf](https://brcn.gov.np/publication/6.CERP_Kankai.pdf)

<sup>75</sup> Dhital, Y. P., & Kayastha, R. B. (2013). Frequency analysis causes and impacts of flooding in the Bagmati River Basin, Nepal. *Journal of Flood Risk Management*, 6(3), 253-260.

<sup>76</sup> Shreevastav, B. B., Tiwari, K. R., Mandal, R. A., & Singh, B. (2022). "Flood risk modeling in southern Bagmati corridor, Nepal" (a study from Sarlahi and Rautahat, Nepal). *Progress in disaster science*, 16, 100260.

<sup>77</sup> Dhungana, H., Pain, A., & Dhungana, S. P. (2016). Disaster risk management and meso-level institutions in Nepal: a case study of floods in Tinau River in Western Terai. *Climate Change and Rural Institutions (CCRI) Research Project, CCRI Case Study*, 6.

<sup>78</sup> [https://lib.icimod.org/record/24994/files/c\\_attachment\\_387\\_3836.pdf](https://lib.icimod.org/record/24994/files/c_attachment_387_3836.pdf)

<sup>79</sup> Shrestha, U. S. (2023). Environmental Flow and River Ecology: A Case Study from Tamakoshi River Basin of Central Nepal. *Research Journal of Padmakanya Multiple Campus*, 2(1), 114-126.

<sup>80</sup> Change, C. (2015). The Production of Landslides Risks and Local Responses: A Case Study of Bhirkot, Dolakha District of Nepal.

<sup>81</sup> <https://academic.oup.com/book/32353/chapter-abstract/268614844?redirectedFrom=fulltext>

community vulnerability and enhance adaptive capacity in response to climate change, while also supporting the United Nations' "Early Warnings for All" initiative. The WMO will oversee and execute the project, leveraging its international and regional presence, while National Meteorological and Hydrological Services (NMHSs) in Nepal and Bangladesh will manage local execution, coordination, and stakeholder engagement. A regional inter-governmental entity will serve as the focal point for hosting the HydroSOS Early Warning System, coordinating data sharing, and linking national structures. The NMHSs will ensure project sustainability by sharing meteorological, hydrological, and climatological data and related products, which will be disseminated to the community level by various agencies.

This rich geographical diversity of the country is further enriched by diverse climate, rich natural resources, abundant water resources, fertile lands, and rich cultural diversity form a sound basis for the socio-economic development of the country.

The HydroSOS-BaNe Project seeks to address the environmental and social challenges posed by floods and droughts in Bangladesh and Nepal. Through integrated water resources management and early warning systems, the project aims to enhance preparedness, resilience, and sustainable development in the GBM River Basin. The project emphasizes the importance of environmental and social impact assessments to comply with the Adaptation Fund's policies, ensuring minimal negative impacts on the environment and socio-economic condition.

### 2.1 Project Components

#### **Component 1: Enhance capabilities and establish structures at local, national, and regional levels to promote decision-making.**

- Enhance understanding of risks through the establishment of risk maps and the dissemination of knowledge.
- Incorporate future climate scenarios (economic, urban, climate, etc.) into existing risk maps to understand potential future impacts on various socio-economic and environmental sectors.
- Integrate short, medium, and long-term risk management strategies into development plans, encompassing economic, social, and environmental considerations.

#### **Component 2: Develop specific strategies for adapting to and mitigating climate change that prioritize environmental sustainability through an integrated approach.**

- Development of the HydroSOS EWS with integration of existing information, products and tools from completed and on-going projects and initiatives
- Pilot testing of the end-to-end Early Warnings System and community-based flood and drought management activities including locally led adaptation measures
- Increasing awareness among vulnerable populations of hydro-meteorological risks, prevention, preparedness, response, and mitigation strategies through educational programs with participatory approaches

#### **Component 3: Strengthening the policy and institutional capacity for the integrated management of floods and droughts at local, national, and cross-border levels.**

- The newly created tools for planning and operational activities are being tested against existing plans to ensure readiness and an effective response to floods and droughts.
- Local, national, and regional institutions (including weather and hydrological) are established for managing risks and have a clear understanding of their roles and coordination mechanisms.
- A collaborative approach is being developed to ensure that these tools and strategies are adopted by local communities and tailored to the specific context.

##### **2.1.1 Screening of the Adaptation Fund's 15 Principles of Environmental and Social Policy and Gender Policy against the Project Activities**

In this study, the environmental and social assessment for the HydroSoS-BaNe Project (Nepal Part) is conducted in accordance with the principles of the Adaptation Fund (AF).

The **Adaptation Fund's 15 principles** are as follows:

- **Principle 1: Compliance with the Law:** Projects/programs funded by the AF must be compliant with all national and international rights applicable. The Implementation Entity will ensure that the project will be in accordance with the national and international law applicable.
- **Principle 2: Access and Equity:** Projects/programs funded by the AF must be compliant with all national and international rights applicable. The implementation entity will ensure that the project will be in accordance the national and international law applicable.
- **Principle 3: Marginalized and Vulnerable Groups:** Projects/programs funded by the funds must not impose any negative impact on marginalized and vulnerable groups, including children, women and girls, the elderly, indigenous peoples, the tribal groups, displaced persons, refugees, persons living with disabilities and people living with HIV/AIDS.
- **Principle 4: Human Rights:** Projects/programs funded by the Fund must satisfy and if necessary, promote human rights as defined at international level
- **Principle 5: Gender Equality and Women Empowerment:** Projects/programs funded by the Fund must be designed and implemented to ensure that women and men: 1) have equal opportunities to participate in accordance with the UNFPA gender equality policy; (2) receive social benefits and comparable economic; and (3) do not suffer from negative effects disproportionate during the development process.

- **Principle 6: Core Labour Rights:** Projects/programs funded by the AF must satisfy such core labour standards as defined by the International Labor Organization.
- **Principle 7: Indigenous Peoples:** The Fund does not fund projects/programs that are incompatible with the rights and obligations set out in the Declaration of the United Nations on the rights of indigenous peoples and other international instruments relating to the indigenous people
- **Principle 8: Involuntary Resettlement:** Projects/programs funded by the Fund must be designed and implemented so as to avoid or reduce to a minimum the need for involuntary resettlement. When limited involuntary resettlement is unavoidable, due process must be respected so that displaced persons are informed of their rights, found on their options and that they be offered technical, Economic and social alternatives for possible resettlement or a fair and appropriate compensation.
- **Principle 9: Protection of the Natural Habitats:** The Fund does not fund projects/programs that would include a wrongful transformation or a reduction of critical natural habitats, including those who are (a) legally protected; (b) which are the subject of an official of protection proposal; (c) recognized by sources for their high ecological value, including as critical habitat; or (d) recognized as protected by the local indigenous or traditional communities.
- **Principle 10: Conservation and biodiversity:** Projects/programs funded by the Fund must be designed and implemented so as to avoid any reduction or significant or unjustified biodiversity loss or the introduction of invasive species.
- **Principle 11: Climate change:** Projects/programs funded by the Fund should not lead to a significant or unjustified greenhouse gas emissions or other factors of climate change.
- **Principle 12: Pollution Prevention and efficient use of resources:** Projects/programs funded by the Fund must be designed and implemented to meet international standards to maximize efficiency and minimize the use of material resources, production of waste and pollutants
- **Principle 13: Public health:** Projects/programs funded by the Fund must be designed and implemented so as to avoid potential negative impacts on public health.
- **Principle 14: Cultural and physical heritage:** Projects/programs funded by the Fund must be designed and implemented to avoid the alteration, deterioration, or removal of physical cultural resources, cultural sites and sites with natural values unique recognized as such at the community, national or international level.
- **Principle 15: Land and soil Conservation:** Projects/programs funded by the Fund must be designed and implemented so as to promote the conservation of soils and avoid the degradation or conversion of productive land, or land that make valuable services to the ecosystem.

## 2.2 Gender policy of the Adaptation Fund

The Adaptation Fund (AF) finances climate adaptation projects in developing countries, ensuring equal opportunities for all genders to strengthen resilience to climate change. The AF's updated Gender Policy (GP), approved in March 2021, emphasizes gender equality and human rights, addressing power imbalances and gender gaps. This policy integrates with the Environmental and Social Policy (ESP), requiring compliance to ensure gender considerations throughout project cycles. Early-stage data collection and stakeholder consultations must engage diverse gender groups, while detailed gender analysis informs the development of gender-responsive measures and implementation plans. These measures, integrated into project plans and budgets, are monitored and evaluated to ensure sustained gender-responsiveness.

The AF mandates continuous monitoring, evaluation, and updating of gender assessments, ensuring that funded activities contribute to gender equality and transformative changes. The guidance document provides practical recommendations for implementing entities, emphasizing comprehensive gender-responsive stakeholder consultations, integration of gender-responsive measures, and sharing knowledge for capacity-building. By mainstreaming gender considerations, the AF aims to create adaptation projects that not only avoid harm but also proactively promote gender equality and address root causes of gender inequities.

During the entire EIA and SIA, the entire project activities were screened for any environmental and social risks according to the above 15 principles outline in AF's Environmental and Social Policy as well as gender policy. As noted in the following table, all principles are applicable in the countries and for all sites of the Ganga Brahmaputra Meghna (GBM) River Basin region. Specific principles were analysed on a case-by-case basis during the field visits and in view of the exposure to one or both floods and drought hazards. It is also noted that when a specific risk is applicable and triggered, this could lead to other risks as well. The EIA and SIA identified other dependent risks and a combined mitigation measures will be developed for such risks and its negative impacts, before the project inception and during the course of project activities.

Table 1 : AF Principles assessed on investigation sites

Sr No	Environmental & Social Principles	Bangladesh	Nepal
1	Compliance with law	✓	✓
2	Access and Equity	✓	✓
3	Marginalized and vulnerable Groups	✓	✓
4	Human Rights	✓	✓

5	Gender Equity and Women Empowerment	✓	✓
6	Core Labour Rights	✓	✓
7	Indigenous peoples	✓	✓
8	Involuntary Resettlement	✓	✓
9	Protection of the Natural Habitats	✓	✓
10	Conservation and Biodiversity	✓	✓
11	Climate Change	✓	✓
12	Pollution Prevention and efficient use of resources	Based on the initial screening, there were no proposed activities that could lead on soil, air or water pollution	Based on the initial screening, there were no activities that could lead on soil, air or water pollution
13	Public Health	✓	✓
14	Physical and Cultural Heritage	✓	✓
15	Land and Soil Conservation	✓	✓

### 3. Some of the Key Policy, Legal and Administrative Framework

#### 3.1 Bangladesh

Principle 1 of the Environmental and Social Policy (ESP) of the Adaptation Fund mandates that all funded projects and programs must comply with applicable national and international laws. For the GBM river basin project in Bangladesh, environmental and social regulations of the GBM basin will serve as the legal foundation for the environmental assessment. Some of the key relevant regulations or acts (the detailed list is available under sections E and F of the HydroSOS-BaNe project concept note) for this project include:

- **Environmental Conservation Act (1995, Amended 2000 and 2002):** Primary legislation for environmental protection, covering clearance, critical areas, standards for air, water, noise, and soil, waste discharge limits, and pollution control guidelines. The Department of Environment of Bangladesh Government enforces the Act under the Director General's guidance. Before commencing a new project, the project promoter must obtain Environmental Clearance from the Director General as per the regulations.
- **Environmental Conservation Rules 1997:** Provides the first set of rules under the Environmental Conservation Act 1995, with an amendment in 2010. These provide amongst others standards and guidelines for (i) categorization of industries and development projects including roads and bridges based on actual and anticipated pollution load, (ii) requirement for undertaking an Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) as well as formulating an Environmental Management Plan (EMP) according to categories of industries/development projects/activities, (iii) Procedure for obtaining Environmental Clearance Certificate (ECC), and (iv) Environmental quality standards for air, surface water, groundwater, drinking water, industrial effluents, emissions, noise and vehicular exhausts.
- **National Environment Management Action Plan 1995:** The National Environmental Management Action Plan was created to tackle particular issues and management needs from 1995 to 2005. It provides a structure for carrying out the recommendations of the National Conservation Strategy.
- **National Environmental Policy 2018:** The National Environmental Policy 2018 was implemented to promote sustainable development in response to environmental disasters, climate change impacts, and natural resource constraints. The policy emphasizes environmental protection, pollution control, biodiversity conservation, and addressing the challenges of climate change.
- **Environment Court Act 2010:** The Bangladesh Environment Court Act of 2010 was established to address conflicts and ensure fairness in cases involving environmental and social harm resulting from development projects. This legislation empowers the government to pursue legal measures against individuals or entities responsible for causing environmental damage in sensitive areas and to society.
- **Bangladesh Water Act 2013 and Bangladesh national water policy 1999:** The Bangladesh Water Act of 2013 addresses various aspects of water management in the country. It provides a comprehensive framework for the regulation, conservation, and equitable distribution of water resources. The act aims to ensure sustainable use of water, promote integrated water resource management, and establish a system for resolving water-related disputes.

#### 3.2 Nepal

The Environmental and Social regulations of Nepal is the legal basis for the project Environmental and Social Impact Assessment. Different regulations in terms of the environmental and social regulations applicable in this project are the following:

- **The Constitution of Nepal**  
**Article 51: Policies of the State**  
(f) Policies relating to Development:

(g) Policies relating to Protection, Promotion and Use of Natural Resources:

(1) To protect, promote, and make environmentally friendly and sustainable use of, natural resources available in the country, in consonance with national interest and by adopting the concept of inter-generational equity, and make equitable distribution of benefits, according to priority and preferential right to the local communities.  
(9) To make provisions of advance warning, preparedness, rescue, relief, and rehabilitation in order to mitigate risks from natural disasters.

(h) Policies relating to Basic Needs of Citizens.

- **Water Resources Act, 1992:** The Act has a provision to utilize the water resources without having a significant adverse effect on the environment due to soil erosion, flood, landslides or similar other reasons.
  - **Environmental Protection Act, (2019) :** This act amends and consolidate the prevailing law on environmental protection in order to protect the fundamental right of each citizen to live in a clean and healthy environment, provide the victim with compensation by the polluter for any damage resulting from environmental pollution or degradation, maintain a proper balance between environment and development, mitigate adverse environmental impacts on environment and biodiversity and face the challenges posed by climate change. The act also creates a fund dedicated to environmental protection and establishes a council responsible for overseeing environmental protection and managing climate change at the national level. It also empowers governments to incorporate essential measures for mitigating the adverse impacts and risks of climate change into the sectoral policies, strategies, and action plans implemented by federal, provincial, and local authorities.
  - **Disaster Risk Reduction and Management Act, 2017:** The Act emphasizes the reduction of negative environmental and human impacts through effective waste and pollution management. It advocates for enhancing disaster risk reduction, disaster preparedness, disaster dividends, and reconstruction activities to protect economic and social development as well as the environment. The Act also mandates conducting studies and research on various hazards such as river training, flood control, landslides, earthquakes, global warming, climate change, and land use. These studies aim to identify and implement mitigation measures. By focusing on disaster risk reduction and management, the Act indirectly addresses broader environmental and climate-related challenges, promoting a safer and more sustainable future.
  - **Disaster Risk Reduction and Management Act, 2017:** The Disaster Risk Reduction and Management Act, endorsed by the Government of Nepal in 2017, is a pivotal legal instrument designed to guide the comprehensive disaster management cycle within the country. Superseding the Natural Calamity Relief Act of 1982, this Act was promulgated under the authority of the Constitution of Nepal. It acknowledges the critical need for a coordinated and effective framework to implement disaster risk reduction and management activities. The primary aim is to protect public, private, and individual resources, as well as natural and cultural heritage and physical structures, from both natural and man-made disasters.
  - **Environmental Protection Regulations, (2020):** The Government of Nepal has further made the regulations based on the Environmental Protection Act, 2076. The regulation has defined a list of projects/activities whether Brief Environmental Study (BES), Initial Environmental Examination (IEE) or Environment Impact Assessment (EIA) is required. Detailed methodologies for scoping, Terms of Reference, public hearing and reporting mechanism of environmental studies. As per EPR, if there is any establishment of station or meteorological radar within the boundary of forest then it is necessary to conduct Brief Environmental Study.
  - **National Climate Change Policy, 2019<sup>82</sup> :** The National Climate Change Policy was developed with the goal of contributing to the nation's socio-economic prosperity by fostering a climate-resilient society. The policy aims to promote climate change adaptation within communities, enhance resilience, encourage a green economy, support low carbon emission development, and ensure the effective mobilization of national and international financial resources for climate change mitigation and adaptation. The policy encompasses eight thematic sectors and four cross-cutting sectors, with a specific focus on buildings, energy, and the environment. Climate-friendly villages and cities will be established by developing safe, sustainable, and resilient habitats and infrastructures. The following measures will be undertaken:
    - **Development and Implementation of Standards:** Standards will be developed and implemented for systematic rural and urban settlement infrastructures and buildings.
    - **Green Plantation Initiatives:** Plantation will be carried out on roadsides and unused land, adhering to the concept of green villages and cities.
    - **Incorporation of Low Emission Technologies:** Low emission technologies and adaptation programs will be integrated into settlement development plans to promote climate-friendly villages and cities.
- Roles and Responsibilities of different level of government**
- Federal Level:** Formulate laws and standards, develop National Adaptation Plan, mobilize financial resources, prepare carbon registry, coordinate at international and national levels, update national data, and participate in international forums related to climate change.

82 GoN. (2019a). National Climate Change Policy, 2076 (2019). In Government of Nepal (pp. 1–26). Government of Nepal. <https://www.mofe.gov.np/uploads/documents/climatechangeenglishpdf-9975-841-1660734867.pdf>

**Province Level:** Formulate provincial policies, monitor, and evaluate programs, coordinate with federal and local levels, and implement programs and projects related to climate change.

**Local Level:** Formulate local policies, conduct climate change programs, raise public awareness, mobilize volunteer committees and stakeholders, and monitor, evaluate, and document programs within the local level.

- **Vulnerability and Risk Assessment and Identifying Adaptation Options, 2021: Sectoral Report Rural and Urban Settlements (Municipal Level)<sup>83</sup>** : Urban settlements are significantly impacted by climate change, experiencing floods, landslides, droughts, epidemics, heatwaves, and fires. These events lead to loss of life and property, damage to infrastructure and cultural heritage, and disrupt socioeconomic services. They also affect health, sanitation, air and water quality, and increase migration and informal settlements, with the impact being more severe on vulnerable and marginalized groups.

A study on sensitivity and adaptive capacity to climate events shows that 121 municipalities have high sensitivity, 179 have low adaptive capacity, and 40 have high adaptive capacity. Older municipalities established before 2011 show higher adaptive capacity. Among 293 municipalities, 37 are highly vulnerable, 52 are moderately vulnerable, and 204 are less vulnerable. Established cities like Pokhara, Dharan, Kathmandu, and Biratnagar have high adaptive capacity and low vulnerability.

- **National Adaptation Plan (NAP) – 2021-2050<sup>84</sup>** : Nepal's National Adaptation Plan (NAP) aims to align with the UNFCCC agreement, focusing on short-term (by 2025), medium-term (by 2035), and long-term (by 2050) adaptation to climate change impacts. The plan seeks to enhance adaptive capacity and resilience, integrating climate adaptation into policies, programs, and activities. Guided by principles of responsiveness, policy coherence, integration, gender responsiveness, and social inclusion, the NAP fosters multi-stakeholder engagement and cooperation. Aligned with the National Climate Change Policy 2019, the NAP prioritizes 64 interventions categorized across eight thematic sectors and four cross-cutting areas, aimed at addressing Nepal's climate challenges effectively.

In addition to its core objectives, Nepal's National Adaptation Plan (NAP) prioritizes the development of integrated resettlement and relocation models for populations vulnerable to climate and disaster risks. By 2030, the plan aims to establish emergency holding centers in 50 cities, expanding to 200 cities by 2035 and 500 cities by 2045. By 2040, it targets the relocation of 300 highly vulnerable settlements to safer areas and the upgrading of 300 compact settlements to enhance resilience against climate and disaster risks. Moreover, the plan calls for the development and implementation of integrated land-use plans in all 293 municipalities and 460 rural municipalities by 2040.

The NAP also focuses on upgrading and promoting climate-resilient building designs, codes, practices, and construction technologies across Nepal. It advocates for the preparation or revision of climate risk-informed urban and rural development plans. By 2025, the plan aims to develop and disseminate a catalogue of climate-resilient building designs, practices, and construction materials. Additionally, it plans to establish and operationalize 15 new climate-resilient building information and demonstration centers across seven provinces and five physiographic zones by 2030. These initiatives are aimed at enhancing national capacity and readiness to implement climate adaptation strategies effectively.

- **Gender and Urban Climate Policy, 2015:** The policy underscores the empowerment of women through technology, exemplified by initiatives such as the Barefoot College and Solar Sister, which train women in solar engineering, thus creating employment opportunities and challenging traditional gender roles. It prioritizes enhancing gender balance in decision-making bodies, employing community-based participatory processes, conducting gender impact assessments, and adapting urban transport systems with a gender-sensitive approach. The policy also focuses on promoting adaptation and resilience, with special attention to enhancing community resilience and ensuring equitable access to resources for women. Globally, women remain underrepresented in decision-making roles, influencing planning and outcomes. Key strategies include integrating gender-sensitive perspectives into climate change discussions, addressing socio-economic and political gender disparities, ensuring equal participation of women and men in decision-making processes, and considering their unique needs and capabilities. Building resilience within communities and neighborhoods stands as a primary goal for effective adaptation strategies.
- **Irrigation Policy 2013:** The Government of Nepal's strategy for irrigation development is anchored in the Water Resources Strategy (2002), National Water Plan (2005), Irrigation Development Vision and Action Plan (2006), and Irrigation Policy (2013). These documents emphasize integrating agriculture and irrigation development to maximize investment benefits and provide sustainable services through effective irrigation facilities and local resource mobilization in partnership with users and the government.

The Irrigation Policy aims to:

83 MoFE. (2021b). Vulnerability and Risk Assessment and Identifying Adaptation Options: Sectoral Report Rural and Urban Settlements (Municipal Level). In Government of Nepal Ministry of Forests and Environment. <https://www.mofe.gov.np/resources/study-reports-3115>

84 GoN. (2021). National Adaptation Plan (NAP) 2021-2050. In Government of Nepal (pp. 1–148). Government of Nepal. <https://www.mofe.gov.np/uploads/documents/nap-book-finalpdf-1278-504-1700479041.pdf>

- Provide year-round irrigation to suitable lands through effective water resource utilization.
- Enhance the institutional capacity of Water Users for sustainable system management.
- Improve the knowledge, skills, and operational capacity of technical human resources, water users, and NGOs in irrigation sector development.

Key policy elements include:

- Year-round irrigation services to boost agricultural productivity and extend cropping seasons.
- A service-oriented management approach for reliable and flexible water services.
- Shifting operation and maintenance costs to water users for greater efficiency, equity, and sustainability.

Although predating the new Constitution and needing revision, the policy is climate responsive. It includes strategies like floodwater storage and inter-basin water transfer to address climate-induced water supply variations. It promotes integrated water resources management at the basin scale to address climate change, ensuring year-round irrigation, effective water resource management, and building the institutional capacity of stakeholders.

- **Water Resources Policy 2020:** In December 2020, the Government of Nepal released a new Water Resources Policy embracing the principles of Integrated Water Resources Management (IWRM) and river basin organizations to enhance water resource management. The policy's goal is to sustainably conserve, manage, and develop water resources for economic prosperity and social transformation. It targets seven objectives: judiciously using water resources to meet multisectoral demands, enhancing national productivity, making science-based decisions, ensuring coordinated efforts among government levels, fulfilling citizen demands for water, minimizing environmental impacts, and reducing water-induced disasters. To achieve these objectives, the policy outlines eleven working strategies, including river basin master planning, prioritizing IWRM and multipurpose uses, developing suitable institutions, encouraging stakeholder participation, increasing research and data utilization, and clarifying the roles of federal, provincial, and local governments. The policy also emphasizes protecting project-affected areas and people, ensuring equitable access to energy, drinking water, and irrigation benefits, and minimizing negative impacts on society, culture, and the environment. Effective watershed and basin management, disaster control, and risk reduction are prioritized. Despite these comprehensive strategies, the policy lacks clear delineation of roles and responsibilities across government tiers, potentially causing coordination issues. The policy incorporates IWRM principles and uses river basins as units of water administration, with action plans for strategic planning, water accounting, allocation, and auditing based on scientific data and facts.
- **National Policy for Disaster Risk Reduction, 2018:** The primary objective of this policy is to significantly reduce losses from both natural and non-natural disasters, encompassing impacts on lives, property, health, livelihoods, production, infrastructure, and cultural and environmental assets. To achieve this, the policy aims to enhance understanding and accessibility of disaster risk information at all levels and strengthen disaster risk governance for effective reduction and management. It seeks to integrate disaster risk reduction into all development processes, aligning it with climate change adaptation activities. Additionally, the policy focuses on increasing public and private investment in disaster risk reduction to enhance resilience. Improving disaster preparedness and response is another key objective, which will be achieved through better information management and the expansion of multi-hazard early warning systems. Lastly, the policy emphasizes a "Build Back Better" approach for post-disaster recovery, rehabilitation, and reconstruction.
- **Disaster Risk Reduction National Strategic Plan of Action 2018-2030:** The Disaster Risk Reduction National Strategic Plan of Action is a 12-year national policy (2018-2030) with a multi-sectoral approach aimed at preventing disaster risk, enhancing preparedness, and strengthening resilience to protect lives, property, health, and infrastructure. The policy's strategies focus on building a safer, adaptive, and resilient nation through the development of legal, regulatory, and institutional frameworks at federal, provincial, and local levels. A National Disaster Risk Reduction and Management Authority will be established, and disaster risk reduction will be integrated into sectoral development plans. Public awareness and participation will be promoted, and vulnerability and risk assessments will be conducted for various hazards, including earthquakes, floods, and epidemics. Climate risk assessments will also be performed for vulnerable infrastructures. Key initiatives include developing a Common National Framework for Multi-hazard Risk Assessment, an inter-agency data collection mechanism, and an effective disaster management information system with focus on vulnerable groups. Special funds and monitoring mechanisms will be set up for retrofitting risky infrastructure, and guidelines will be established for disaster preparedness, response, recovery, and rehabilitation. The policy also plans for an integrated national disaster response system, multi-hazard early warning systems, and the establishment of regulations for operating Emergency Funds and Food Banks. Additionally, agricultural insurance, farmer benefit programs, and food and seed storage facilities will be implemented to address disaster risks in agriculture and food insecurity challenges.
- **Irrigation Master Plan 2019:** The Department of Water Resources and Irrigation's new Irrigation Master Plan, building on the 1990 Master Plan, outlines a long-term strategy for the irrigation sector, prioritizing research and development. Although not yet approved, it emphasizes mainstreaming climate change adaptation and sustainable storage development in the Greater Himalayan Region. The plan highlights using natural systems for water

storage, including wetlands conservation, improved watershed management, groundwater recharge, and rainwater harvesting, along with constructing large reservoirs on downstream plains. It also calls for addressing knowledge gaps in sustainable water storage through new research studies.

- **Water Resources Strategy 2002:** With this Water resources Strategy formulated in 2002, Nepal aims to significantly improve its citizens' living conditions sustainably. The Water Resources Strategy focuses on providing tangible benefits from water resources in the short term, substantial benefits in the medium term, and maximized benefits in the long term. This strategy is divided into three areas: ensuring security from water-related hazards and sufficient water supply, optimizing water use for various purposes like agriculture, hydropower, and industry, and establishing effective mechanisms such as regional cooperation and data management for sustainable water resource management. The success of the strategy will be evaluated through specific indicators over 5, 15, and 25-year periods.

These regulatory frameworks will allow the implementation of the project activities.

### **3.3 How this project activities can be supportive in implementing the existing laws, policies, and plans of Bangladesh and Nepal?**

#### **Bangladesh:**

The project will support efforts to reduce the risks and vulnerabilities from climate change in making Bangladesh a climate resilient nation through developing flood and drought risk maps and early warning systems and community-based flood and drought management activities. These activities align with the National Adaptation Plan (2023-2050) as the plan also has the same. Implementation of the National Adaptation Programme of Action (NAPA) will be enhanced through risk mapping of current and projected climate impacts, helping identify understand areas affected by flood and drought events.

Bangladesh Environment and Climate-Resilient Sustainable Development (Vision 2021) which focuses on self-sustaining livelihoods through climate change adaptation and disaster mitigation, will be supported by the development of flood and drought risk incorporating environmental indicators such as wetlands and protected areas to promote a climate-resilient ecosystem. Component 3 of the HydroSOS-BaNe project will contribute to the 8th Five Year Plan by saving lives from future climate events and developing livelihoods through local climate change adaptation strategies.

Strengthening disaster management, research, knowledge management, capacity building, and institutional resilience will be achieved through developing hazard maps, community-based flood and drought management, and providing necessary tools and capacity building to improve population resilience which aligns with Bangladesh Climate Change Strategy and Action Plan (BCCSAP) as the plan has the same objectives. The project will share results from the HydroSOS project, such as community-based flood and drought management in pilot locations, in line with the Bangladesh Climate Change Resilience Fund (BCCRF) Guidelines, 2010. This will enable similar tools and approaches to be applied in other Bangladeshi communities using BCCRF funding.

Preparedness and response activities under National Plan for Disaster Management (NPD) 2021-2025 will be supported by the early warning system (EWS) of the HydroSOS-BaNe project. The aim of the Bangladesh Delta Plan 2100 Formulation Project (BDP 2100) for sustainable development will be supported through an integrated flood and drought early warning system, risk maps, and locally led adaptation measures like raising house levels, improving farming activities, and providing timely warnings to save agricultural crops.

Mobilizing international financing for renewable energy and climate resilience initiatives will be partially supported by HydroSOS through its EWS, risk understanding, preventive measures identification, and empowering populations with locally led adaptation measures which aligns with Mujib Climate Prosperity Plan. The EWS will support each ministry and agency in preparing and implementing detailed work plans to fulfil their responsibilities efficiently, ensuring coordinated and effective disaster response and management, thereby supporting the execution of Updated Standing Order on Disaster (2019). The HydroSOS-BaNe project will advance the Sustainable Development Goals (SDGs), particularly in climate change adaptation, disaster management, gender equality, agriculture, and environmental protection.

#### **Nepal:**

Implementing effective Early Warning Systems (EWS) in Nepal will significantly enhance the country's disaster risk management and support sustainable development by aligning with various national policies and laws. EWS will help mitigate risks from natural hazards such as floods, landslides, and extreme weather events by providing timely alerts that enable communities to prepare, respond, and recover more efficiently. This approach aligns with the Disaster Risk Reduction and Management Act, 2017, which emphasizes minimizing adverse environmental and human impacts through enhanced disaster preparedness and response.

The Constitution of Nepal, specifically Article 51(g)(9), mandates provisions for advance warning, preparedness, rescue, relief, and rehabilitation to mitigate risks from natural disasters. EWS directly supports these goals by facilitating early action to prevent loss of life and property, thereby enhancing community resilience. Moreover, the Environmental Protection Act, 2019, underscores the need to mitigate adverse environmental impacts

and address climate change challenges, which can be effectively addressed through robust EWS that integrate climate adaptation strategies.

This project will incorporate gender-sensitive approaches which aligns with Nepal's Gender and Urban Climate Policy, 2015. This policy emphasizes women's empowerment, equitable access to resources, and active participation in decision-making processes. EWS will be designed to ensure that alerts and information reach both men and women, considering their specific needs and roles within communities. For example, training women as community-based disaster response leaders will enhance their participation and leverage their local knowledge, contributing to more effective disaster management.

Local livelihoods and environmental sustainability will also be significantly strengthened through this project. By providing accurate and timely warnings, the project will enable farmers to protect their crops and livestock from impending floods or droughts, thereby safeguarding agricultural productivity and food security. The Irrigation Policy, 2013, which aims to provide year-round irrigation and enhance water resource management, can be effectively supported through better planning and water use efficiency in response to climate variability.

The National Climate Change Policy, 2019, and the National Adaptation Plan (NAP) 2021-2050, prioritize building climate-resilient communities and infrastructure. This EWS project will play a crucial role in achieving these objectives by reducing vulnerabilities and enhancing adaptive capacities at the local level. The implementation of HydroSOS-BaNe project, which focuses on strengthening early warning systems, exemplifies how technological advancements can be harnessed to protect communities and the environment.

This project and EWS will also contribute to environmental protection by preventing soil erosion, floods, and landslides, aligning with the Water Resources Act, 1992, which emphasizes minimizing adverse environmental effects. By integrating EWS with local land-use planning and environmental impact assessments, as outlined in the Environmental Protection Regulations, 2020, Nepal can ensure that development projects are resilient and sustainable.

Moreover, EWS support the goals of the Water Resources Policy 2020 and the National Policy for Disaster Risk Reduction, 2018, by providing crucial data for water resource management and disaster risk reduction. These systems enable the implementation of river basin master planning and the development of effective disaster management frameworks, promoting a balanced approach to environmental conservation and economic development.

In summary, Early Warning Systems are essential tools for enhancing disaster resilience, supporting local livelihoods, and promoting environmental sustainability in Nepal. By aligning with national laws and policies, EWS can ensure a safer and more equitable future for all Nepali citizens, with special consideration for vulnerable and marginalized groups.

#### 4. Methodology & Work Plan

The methodology ensures the validity and reliability of the Environmental and Social Impact Assessment (ESIA) by providing a systematic approach for data collection, analysis, and interpretation, promoting transparency and trust through scoping meetings, literature reviews, public consultations at local and national levels, and ESIA reports. This participatory and inclusive approach aligns with the guidelines provided in the Terms of Reference (ToR) and the detailed scope of work, ensuring the active involvement of all stakeholders, particularly vulnerable communities like women and the elderly, local government officials, and central-level agencies/ministries.

##### 4.1 Scoping Meeting

In Bangladesh, the scoping meeting was held with the Bangladesh Meteorological Department (BMD) to discuss objectives, national agencies to be involved in the consultations, geographic areas (northwestern Kurigram, and western Rajshahi regions) to carry out community consultations, timelines, resources, and data collection methods for the assessment. In the case of Nepal, a scoping meeting was held with Department of Hydrology and Meteorology (DHM) to discuss objectives, identify national agencies focal points for consultation meetings, geographic areas (Kankai, Bangladesh, Tinau River (Palpa, Rupandehi), Tamakoshi River (Dolakha), timelines, etc.

##### 4.2 Desk review

The consultant reviewed the project concept note documents and literature related to the HydroSOS-BaNe project including the present characteristics and baseline situations, interdisciplinary practices and approaches associated with the use of natural resources (ecosystems and other environmental resources) and social and cultural welfare (livelihood and social system) in the GBM region. The consultant also reviewed the 15 principles of the ESP and the Gender policy of Adaptation Fund, examining its compliance.

##### 4.3 National agencies and Public Consultation

The list of stakeholders consulted at the national level is provided in the below Table (full list of names is available under Annex II):

Table 2: List of National agencies and Public Consultation carried out during EIA and SIA

Bangladesh	Nepal
Names of the agencies or department consulted	Names of the agencies or department consulted
Flood Forecasting and Warning Centre (FFWC)	Ministry of Women, Children and Senior Citizens

Bangladesh Water Development Board (BWDB), Ministry of Water Resources	Ministry of Forest and Environment
Water Resources Planning Organization (WARPO)	Ministry of Energy, Water Resources and Irrigation
Department of Agriculture Extension (DAE), Ministry of Agriculture (MoA)	Department of Hydrology and Meteorology
Bangladesh Meteorological Department (BMD)	High Powered Committee for Integrated Development of the Bagmati Civilization
Ministry of Disaster Management & Relief	National Disaster Risk Reduction and Management Authority
Local government and public consultations in Upazila	Water and Energy Commission Secretariat
	Department of Water Resource and Irrigation
	Local Government (Bhimeshwor Municipality, Kankai Municipality, Jhapa Rural Municipality, Shivasathakshi Municipality).

The Public Consultation site was selected on the basis of the Pilot test site of HydroSoS. The site also includes flood areas, water deficit areas, settlements of marginalized and indigenous people.

### Focus Group Discussions at Local Level

Four focus group discussions (FGDs) were conducted in flood-prone Kurigram and drought-prone Rajshahi districts in Bangladesh, with a total of 74 participants (69 males and 5 females), including community leaders, NGO personnel, school, teachers, religious leaders, indigenous people, traders, women, and progressive farmers. In Nepal, 3 FGDs were held in flood-prone and drought-prone districts, involving 40 participants (20 males and 20 females, including 1 person with disability), consisting of community leaders, NGO personnel, experts, and local stakeholders. The field visit was conducted during Nepal's rainy and cultivation seasons, presenting significant challenges in meeting with many participants. Most were occupied with agricultural activities and flood preparedness at the site, making it difficult to engage with them. The number of participants by location is detailed in Table 4.

Table 3: Number of Focus Group Discussion: Bangladesh

S. No	Name of Upazila	Name of District	Name of Division	No. of participants		
				Male	Female	Total
<b>Bangladesh</b>						
1.	Nageswari	Kurigram	Rangpur	19	04	23
2.	Burungamari			15	00	15
3.	Tanore	Rajshahi	Rajshahi	19	00	19
4.	Godagari			16	01	17
<b>Total</b>				<b>69</b>	<b>05</b>	<b>74</b>

Table 4: Number of Focus Group Discussion: Nepal

S.N.	Name of River Basin	RM/M	Male	Female	Total
1.	Tamakoshi River (Dolakha)	Bhimeshwor M	6	4 (1PWD)	10
2.	Kankai River	Kankai M	2	-	30
		Jhapa RM	12	15	
		Shivasathalshi M	-	1	

### Key Informant Interview at National Level in Bangladesh

Data were also collected through Key Informant Interviews (KIIs) using a semi-structured checklist at the national level. The key informants included a Superintending Engineer and Hydrological Adviser, an Executive Engineer from the Bangladesh Water Development Board, a Principal Scientific Officer from the Water Resource Planning Organization, a Senior National Agromet Technical Coordinator from the Department of Agricultural Extension, Meteorologists from the Bangladesh Meteorological Department, and a Disaster Management Specialist from the Department of Disaster Management.

### Key Stakeholder Consultation and Public Consultation

The consultant carried out the consultation with the Ministry of Energy, Water Resources and Irrigation, Ministry of Forest and Environment, Ministry of Women, Children and Senior Citizens, National Disaster Risk Reduction and Management Authority in close coordination with the Department of Hydrology and Meteorology about the process of conducting EIA and SIA and preparing the Environmental and social risk management plan.

The Consultant visited the flood and drought prone areas and conducted the consultation with the local people including women, members of marginalized, vulnerable and minority groups and indigenous people, to assess the potential environmental and social risks of the proposed project activities.

#### **Key Informant Interview at Local Level**

##### **KII Interview: Bangladesh**

Data were collected through Key Informant Interviews (KIIs) using a semi-structured checklist at the local level. There were 7 key informants, including Executive Engineers from the Bangladesh Water Development Board, Meteorologists from the Bangladesh Meteorological Department, Upazila Agriculture Officers from the Department of Agricultural Extension, and personnel from NGOs.

##### **KII Interview: Nepal**

Engaging the community throughout various phases facilitates a two-way exchange of information, enhancing the entire process. The expert and assessment teams presented planning and climate-related scientific information in an accessible manner, raising awareness about current and future climate change risks within the community. This engagement helped the team understand the ground-level scenario of exposure, vulnerability, adaptive capacity, and risk, along with the community's knowledge on these subjects. Participatory data collection methods captured the main challenges faced by community members and their perceptions of current and future risks and challenges, enabling the identification of context-sensitive solutions that enhance adaptive capacity while incorporating indigenous/local knowledge and practices.

Community engagement throughout the entire process was built for ownership of the planning process and related interventions, leading to higher levels of accountability, more inclusive, and climate-resilient planning and development. This engagement was facilitated through Key Informant Interviews (KII), stakeholder consultations, and workshops. These sessions involved policymakers, policy implementation actors, academia, experts, and stakeholders at local, provincial, and national levels. Key aspects considered included:

- participatory workshops with consistent participant engagement.
- Conducting culturally sensitive facilitation.
- Ensuring perspectives of vulnerable groups through separate focus group discussions or KIIs.

The list of participants in the FGDs and KIIs is enclosed in Appendix-II and the pre-prepared semi-structured checklist for FGDs and KIIs is enclosed in Appendix I.

#### **5. Environment and Social Impact Assessment (ESIA) Report**

The ESIA report evaluates a project's potential environmental and social impacts before its execution. It identifies and assesses positive and negative effects, developing strategies to enhance benefits and mitigate adverse impacts. The report improves project design, promotes environmentally sensitive decision-making, increases accountability, and integrates projects into their environmental and social settings. Benefits include reducing environmental damage, improving socio-economic outcomes, and enhancing project acceptance by local communities. The report also proposes mitigation measures for the 15 Environmental and Social Principles (ESP) and Gender principles of the Adaptation Fund. Key elements of the report include objectives, methodology, impact analysis, and conclusions.

#### **Concerns of the Stakeholders in Bangladesh and Nepal** related to the current state of EWS, Flood and Drought Management

Stakeholder consultations used a participative approach involving field visits, document review, and interviews with local communities, technical services, agricultural producers, and women's and youth associations. This participatory consultation and involvement of various stakeholders allowed us to identify general existing environmental and social issues that could be supported by the project activities, aiding in the project's effective implementation and long-term sustainability.

Each meeting discussed the project's objectives and activities, focusing on possible positive and negative economic, social, and environmental impacts resulting from the project. National stakeholders acknowledged potential indirect risks but emphasized that the project's non-structural measures (early warning system and dissemination, risk mapping, community-based flood and drought management activities, capacity building) would support in timely information about the climate change events and support in preparedness and adaptive measures at all levels, eventually minimize negative impacts. This has been a challenge until now to receive timely warnings and advisory services from the national services for localized events such as floods and drought. The proposed project will strengthen the capacity at the national and local levels with technical and non-technical tools, knowledge, sharing of experiences, etc. Technical institutions are committed to developing tools to mitigate adverse effects.

All 15 principles for the Adaptation Fund (AF) were discussed during stakeholder consultation meetings and Key Informant Interviews (KII) with stakeholders at both the Upazila and national levels. In these discussions, stakeholders indicated that the project does not have any direct social or environmental risks related to human rights, conservation and biodiversity, climate change, pollution prevention and resource efficiency, public health, physical and cultural heritage, and land and soil conservation. This is because the project does not have any direct activities related to these issues. Instead, it aims to raise awareness about them through its community capacity-building programs.

Table 5: Project Relevance and Recognition from Stakeholders for having the HydroSOS-BaNe project

National	<ul style="list-style-type: none"> <li>• Scope of technical and instrumental improvement of the associated institutions</li> <li>• Unsustainable flood and drought control strategies</li> </ul>
local	<ul style="list-style-type: none"> <li>• Lack of coordination among stakeholders in flood and drought management</li> <li>• Poor community participation in early warning systems</li> </ul>
Community	<ul style="list-style-type: none"> <li>• Complex early warning systems and inadequate dissemination skills</li> <li>• Ineffective post-flood and drought initiatives</li> <li>• Frequent flooding and drought in both Bangladesh and Nepal</li> </ul>

There were three categories of stakeholders including producers, local elites, teachers, Upazila representatives and NGO representatives in rural areas; technical service providers included agriculturist and metrologist at Upazila level; hydrologist, meteorologist, environmentalist and disaster management specialist at national level. Similarly, in Nepal, stakeholders were categorized as National level, Regional Level, local government level and community level.

#### **The concerns of the rural level focus on**

- Inaccurate and delayed warning message dissemination
- Ineffective seasonal forecasting
- Complex and non-understandable forecasting
- Inactivate Union Disaster Management Committee/Local disaster management committee
- Poor community participation in dissemination systems
- No alternative livelihood support during impending period
- Inconsistent rainfall and prolonged dry periods hinder crop growth
- Lower rainfall reduces groundwater recharge and surface water availability
- Droughts cause economic hardship for farmers as agriculture is the main livelihood
- Prolonged drought conditions lead to soil erosion, soil moisture and loss of soil fertility.
- Water scarcity can lead to poor sanitation and health issues.

#### **The concerns of the Upazila technical stakeholders focus on**

- No drought forecasting systems
- Not maintaining the chain of command
- Lack of coordination among the agencies
- Poor engagement of other departments with forecasting and warning agencies
- No local level platform for follow up and monitoring

#### **The concerns of the national level stakeholders focus on**

- Numerical calculation for three days lead-time accuracy is possible but accuracy for mid and long term can be possible through probabilistic rainfall forecasting
- Poor coverage for forecasting and early warning messages dissemination
- Coordination gap among the Bangladesh Meteorological Department (BMD), Department of Disaster Management (DDM), Bangladesh Water Development Board and Flood (BWDB) and Forecasting and Warning Centre (FFWC)
- Coordination gap between the different Governmental Agencies working in the early warning system and disaster preparedness (DHM, MoHA)
- No or Poor drought monitoring system
- Apps should be used to send voice alerts to vulnerable communities for preparedness.
- Inadequate data sourcing from neighbor countries
- Outdated danger levels in forecasting systems

#### **Cost Effectiveness of HydroSOS Project**

The HydroSOS project's Environmental and Social Impact Assessment (ESIA) study emphasizes the importance of scaling up traditional structural measures, such as embankments, fences, and dikes, by considering forward-looking hazard profiles in relation to climate change scenarios. Given the inherent uncertainties of how climate change will alter hydrological regimes and the local expression of these inevitable changes, it is crucial to implement measures that provide both immediate and long-term adaptation benefits. This approach contrasts with costly, short-term, and infrastructure-oriented disaster risk reduction methods.

#### **Bilateral Partnerships and Last-Mile Services**

A key element of the cost-effectiveness of this approach is the deepening of bilateral partnerships on last-mile weather, water, and climate services. Leveraging and sharing expertise and best practices from both countries can generate reliable information, translate it into user-specific advisories, and disseminate it to last-mile users for socio-economic and environmental benefits. This collaborative approach marks a significant shift from previous practices, as seen in the HydroSOS-BaNe project.

### Enhancing Climate Adaptive Capacities

The proposed project aims to cost-effectively enhance the climate adaptive capacities and resilience of communities facing hydro-climatic risks. By integrating local, national, and regional adaptation strategies and implementation mechanisms, it focuses on the comprehensive monitoring and management of water resources. Floods and droughts, prevalent in both countries, necessitate a robust, cost-efficient solution.

### Strengthening National Services

The project will strengthen the capacities of the National Meteorological and Hydrological Services (NMHSs) through an innovative and tailored Regional Hydro-Meteorological Early Warning System, providing short-term and seasonal forecasts. This system will be embedded into a Long-term Integrated Water Resource Information System. By fostering cross-border collaboration, this initiative will enhance the overall impact by leveraging shared resources and knowledge. Concrete adaptation actions, developed through a participatory process, will be executed in an integrated manner. This cross-border collaboration ensures the sustainability and effectiveness of the project, ultimately leading to a more resilient and adaptive response to hydro-climatic challenges.

### Impact and Historical Context

Between 2011 and 2022 in Nepal, there were 1,811 flood-related incidents, resulting in 876 deaths and 209 injuries. Additionally, 65,295 families were affected, 563 people were reported missing, 11,787 private houses were completely destroyed, and 42,060 private houses were partially damaged<sup>85</sup>. The Post Disaster Needs Assessment (PDNA) estimated that total damage caused by floods is about USD 584.7 million, with total recovery needed was estimated to be about USD 705.1 million<sup>86</sup>.

Flooding in Bangladesh causes an annual loss of around USD 1 billion. Furthermore, increasing drought periods in Bangladesh, exacerbated by climate change, threaten significant agricultural losses by 2050. Wheat production may decline by up to 32%, maize productivity by 20%, and other crops like sugarcane, soybeans, and sorghum by 7-10%, resulting in a cumulative loss of USD 36 billion (3.1% of annual agricultural GDP)<sup>87</sup>.

### Benefits of Early Warning Systems through HydroSOS-BaNe project

The implementation of Flood Early Warning Systems (FEWS) has significantly mitigated flood risk impacts, contributing to a decline in flood disasters from 157 in 2000 to 126 in 2017 and reducing the mortality rate by 45%—from 6,025 deaths annually in 2000 to 3,331 in 2017. The number of people affected by floods decreased from 73 million in 2000 to 55 million in 2017, representing a 24% reduction<sup>88</sup>.

Investments in EWS have shown substantial benefits. In developing countries, economic analysis suggested that each dollar spent on flood early warning could return USD 7.3 in an optimal scenario and USD 3.7 in a modest scenario over 20 years. Upgrading hydro-meteorological systems and early warning capacities in developing countries to match developed countries' standards could yield cost-benefit ratios between 4:1 and 36:1. Global flood-related financial losses from 2000 to 2017 were USD 27 billion, and even a conservative 1% reduction in these losses through early warnings would result in significant savings. A study analyzing the cost-benefit of EWS in Nepal shows that most households perceive EWS as beneficial and reliable, with individual households able to save USD 1083 by preventing loss to their property, livestock, vehicles, and health. Respondents were also willing to pay an annual fee of USD 0.70 for five years, if the EWS were managed by community disaster committees, a fee sufficient to cover the system's annual maintenance and operating cost. Additionally, improving the forecast lead time by one hour can increase current savings by 1.83 times<sup>89</sup>.

In Bangladesh, early warning systems have demonstrated a benefit of approximately USD 559 for every dollar invested over 10 years<sup>90</sup>. These examples underscore the profound economic and human life-saving benefits of investing in EWS, particularly in flood-prone regions like Bangladesh and Nepal, where the returns on investment are notably high.

### Non-Structural vs. Structural Measures based on Local consultation

Stakeholders at both national and local levels emphasize the cost-effectiveness and sustainability of non-structural measures, such as Early Warning Systems (EWS), risk maps, and knowledge-building activities. These measures are appreciated for their ability to save lives by providing timely alerts and strengthening community preparedness. In contrast, structural measures generally have higher initial costs due to technical expertise, construction, and material expenses, and they require significant ongoing maintenance. Non-structural measures typically have lower environmental impacts, promoting sustainable practices, while structural measures can cause habitat disruption,

<sup>85</sup> Adhikari, P. B., & Khanal, N. (2024). Seasonal variations of disasters in Nepal. *Bibechana*, 21(1), 1–11. <https://doi.org/10.3126/bibechana.v21i1.54503>

<sup>86</sup> Post flood Recovery Needs Assessment, Nepal Flood 2017, National Planning Commission, website: <https://www.undp.org/sites/g/files/zskgke326/files/migration/np/PFRNA-Report.pdf>

<sup>87</sup> UNDRR (2020). Disaster Risk Reduction in Bangladesh: Status Report 2020. Bangkok, Thailand, United Nations Office for Disaster Risk Reduction (UNDRR), Regional Office for Asia and the Pacific

<sup>88</sup> ; Perera et. al. 2019. Flood Early Warning Systems: A Review of Benefits, Challenges And Prospects. UNU-INWEH Report Series, Issue 08. United Nations University Institute for Water, Environment and Health, Hamilton, Canada.

<sup>89</sup> Rai, R. K., van den Homberg, M. J. C., Ghimire, G. P., & McQuistan, C. (2020). Cost-benefit analysis of flood early warning system in the Karnali River Basin of Nepal. *International Journal of Disaster Risk Reduction*, 47(January), 101534. <https://doi.org/10.1016/j.ijdrr.2020.101534>

<sup>90</sup> Subbiah, A. R., Lolita, B., & Ramraj, N. (2008). Background Paper on Assessment of the Economics of Early Warning Systems for Disaster Risk Reduction World Bank Group for Disaster Reduction and recovery. Retrieved from <https://econadapt-library.eu/node/1546>

biodiversity loss, reduced cultivable land, and altered natural water flows, leading to significant indirect economic losses.

Local communities acknowledge the necessity of structural measures due to the frequent occurrence of floods and droughts in their areas. However, national experts highlight that non-structural measures are less expensive to implement initially and have lower maintenance costs. Additionally, non-structural measures usually have minimal displacement effects, unlike structural measures, which can displace communities. Accurate seasonal predictions help farmers make informed decisions about planting and harvesting times, selecting crop varieties, and managing water resources efficiently. This proactive approach not only enhances agricultural productivity while strengthening food security and resilience against climatic uncertainties.

### **Long-Term, Integrated Strategies**

*By focusing on long-term, integrated, and cost-effective strategies, this project aims to create a sustainable and resilient future for communities in both countries, addressing the pressing challenges posed by climate change. Increasing public knowledge of flood and drought management and implementing ecosystem adaptation measures to climate change will provide a sustainable basis for the successful implementation of similar programs. Monitoring project activities and outcome analyses will enable relevant authorities and governments to model necessary actions and implement them in other areas.*

*Table 6: Summary of the cost-effectiveness approaches of the HydroSOS-BaNe project*

<b>HydroSOS-BaNe project component/outputs</b>	<b>Proposed HydroSOS-BaNe project beneficiaries and benefits</b>	<b>Alternatives to proposed approach and cost (USD)</b>	<b>Potential social and environmental risks associated with the Alternative approaches (without the HydroSOS-BaNe project) as discussed with the stakeholders of Bangladesh and Nepal</b>
Risk-based preparedness and adaptation to climate variabilities, water use stresses and environmental uncertainties	Development of preparedness and adaptation measures based on dynamic risk assessment and risk-based plans. Differential risk identification and prioritization for vulnerable sections including gender, elderly, disabled. Capacity building at the local community level for making use of risk maps and available information Integration of emerging climate risks into development planning	Disaster risk reduction measures such as the resettlement of vulnerable communities, involve much higher cost, but with limited benefits and detrimental environmental consequences The approximate cost for developing structural disaster risk reduction measures in the selected vulnerable will be around 300 Million USD Conventional risk maps fail to incorporate climate change induced risks and thus will be ineffective	Lack of social security, and livelihood options. Cultural differences in the new locality. Acquiring lands for resettlement due to already populated areas and construction of houses will be costly and might be prone to other hazards. Houses constructed in the risky areas are impacted by growing climate change events. Not having impact-based risk information leads to economic losses of the population. Displacement can lead to the breakdown of community networks and social cohesion, impacting mental health and well-being. Higher incidence of poverty and inequality due to inadequate support for vulnerable sections during resettlement. Environmental degradation due to large-scale construction activities
Strengthening water resources management through access to hydro-meteorological information and augmenting regional /national capacity to monitor and assess Hydro-Meteorological hazards	Regional level data sharing will enable better utilization of water resources and climate change events  Regional approach is critical to mitigate hydro-meteorological hazards through an integrated approach to floods and droughts monitoring and EWS	Droughts monitoring tools are developed separately and operate independently without being integrated at the basin scale. Water resource management framework is country specific and without real time data or meta-data sharing Techno-centric EWS installed without community consultation and participation leading to lack of effectiveness and ownership	Existing national EWS systems are not designed in collaboration with local stakeholders and warning services are not timely nor impact specific. Also, regional aspects are not considered for monitoring of weather, water and climate events. It has been informed by the stakeholders that having timely warning advisories on weather and water will improve 50 % of livelihood or agriculture production, 90 % saving of lives or injuries to

	<p>Participation of communities in designing EWS for floods and droughts. Increasing productivity and better health and utility through access to water resources.</p> <p>Systematic documentation of climatic change effects and filling of gaps in existing observational network</p>	<p>The alternative solution would be to construct dams and reservoirs in vulnerable areas for flood control and irrigation channels, which will approximately cost around 150-300 Million USD, or the next solution would be to reconstruct or retrofit the vulnerable community infrastructure, which would be expensive (approximately 100-150 Million USD) and time consuming due to the need to retrofit in communities and in downstream areas</p>	<p>population. Construction of dams and reservoirs will be costly measures and impact the environmental and ecosystem services in the countries (in Nepal where most of the rivers are in terrain and mountainous regions) especially use of explosive, removal of houses and cultural heritage etc. Also, the construction of structural measures could impact social and economic sectors, as storage of water will not allow populations to use water for irrigation, water use, fishing etc. Also, dams and reservoirs will not provide a guarantee of controlling floods. Alteration of natural water flows can impact downstream ecosystems and agricultural areas.</p>
<p>Water and climate resilient regional cooperation arrangements together with National and regional stakeholders, and community involvement</p>	<p>Operationalization of an integrated Climate adaptation with disaster risk reduction approach at a regional and national levels</p> <p>Community empowerment through involvement in refining national and local policies for effective and efficient implementation of adaptation plan and development practices</p> <p>Sharing of knowledge and practices with other communities of the region</p>	<p>Disaster Risk Reduction and Climate Adaptation programs and policies executed separately without synergy and joint strategy Limited Community involvement and programs without integrating science-based risk mapping and thus failing to be useful</p> <p>Community knowledge sharing is not provided with other neighboring countries/communities</p> <p>The development and update of national policies and programmes will cost approximately 10 Million USD without any concrete output and benefit to stakeholders</p>	<p>Existing Policies and plans are not aligned with the needs of local or community stakeholders which might not provide associated socio-economic benefits.</p> <p>Some national policies and plans need to be updated with the involvement of stakeholders from all sectors and levels. Inadequate community engagement can lead to a lack of ownership and participation in risk reduction and adaptation measures.</p> <p>Potential for increased vulnerability due to the exclusion of local knowledge and practices from policy formulation.</p> <p>Inadequate regional cooperation can hinder the effective management of transboundary environmental issues, such as water resource management and biodiversity conservation.</p> <p>Lack of integrated planning can lead to missed opportunities for enhancing ecosystem resilience through coordinated adaptation measures.</p>

### General Suggestions and recommendations of the stakeholders of Bangladesh and Nepal for the HydroSOS-BaNe project

- Digital dashboard can be set up at public gathering place like the Union Parishad (Local level administrative unit)/Local Government or junction of community centre or marketplace to disseminate the early warning messages directly from central office.
- Establish rainfall trigger thresholds tailored to the specific hydrological and environmental conditions of an area, improving the accuracy and effectiveness of flood forecasting and early warning systems.
- Strengthen the regional coordination for real time data from the neighboring country.
- Strengthening the coordination gap among the Bangladesh Meteorological Department (BMD), Department of Disaster Management (DDM), Bangladesh Water Development Board and Flood (BWDB) and Forecasting and Warning Centre (FFWC)
- Strengthening the coordination gap among DHM, NDRRMA, MOHA,

- By using both Standardized Precipitation Index (SPI) and the Standardized Precipitation Evapotranspiration Index (SPEI) can be used for drought monitoring.
- Strengthening regional coordination for real time data sourcing
- Ensure the involvement of community, NGO representatives and farmers organization, Union Parishad etc at risk areas in risk mapping.
- Strengthen the institutional capacity of the involved institutions with this project.
- Capacity building training for local populations and technical staff on flood preparedness, response, and recovery strategies.
- Increase agricultural productivity through flood and drought-resistant crops and climate-smart technology.

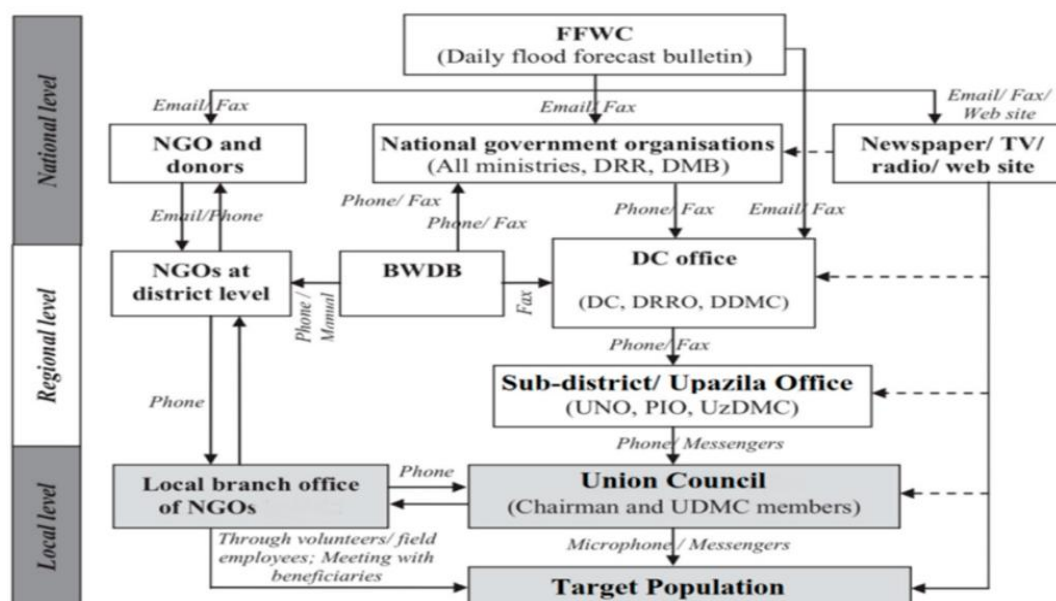


Figure 4 FFWC disseminations network from national to Union Parishad in Bangladesh

Source : <https://www.mdpi.com/1660-4601/18/24/13010>

#### Additional Comments in Nepal: Suggestion and recommendation from stakeholders

Some of the additional comments that were received during the consultation in Nepal.

- The project should partner with an organizations already working on Early Warning System (EWS) instead of running independently.
- The project needs well-trained focal persons at district, municipal, and community levels.
- The project must maintain and strengthen the existing information dissemination hierarchy during and after implementation.

## Flood Forecasting and Early Warning Dissemination Network

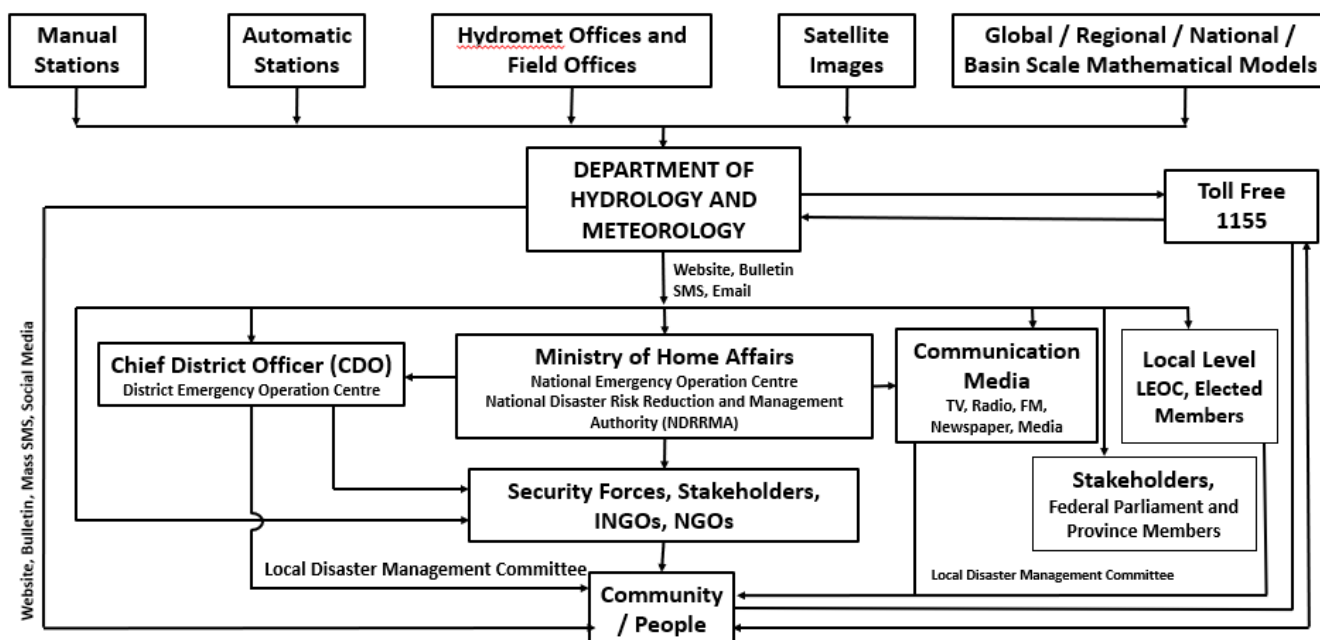


Figure 2: Hierarchy of Information dissemination system

- Involve and train political leaders and parties to support this project and its implementation.
- Hold discussions to create a safe environment for vulnerable groups, especially pregnant women, the elderly, and people with disabilities. Use integrated and participatory approaches such as:
  - Mother Groups (Aama Samuha)
  - Co-operatives (Sahakari)
  - Youth clubs
  - *Khabar Daari*
  - Caller tunes or voice messages
  - Regular Community meetings and consultations
- To ensure this project is realistic and relevant to the current context, the validation and authorization processes must be properly monitored to build public trust in the modelling project.
- The early warning system greatly impacts agriculture; accurate data should be maintained to strengthen the agricultural sector through this project.
- To reach more people, the early warning system should be available in local languages and incorporate indigenous methods such as traditional messenger<sup>91</sup> etc.
- Plan for regular dissemination of the system during power outages.
- There are policy obstacles for transporting plant species between districts. The government should simplify these policies.
- A detailed study is needed to determine the impact of this model on agriculture, hydrology, and other infrastructure
- To offset negative impacts from incorrect forecasts, implement compensation mechanisms like insurance should be implemented by government or project.
- Study the impact of water use in detail on different aspect should be done.
- Conduct a risk assessment of the project/system, including four pillars: risk knowledge, monitoring and observation, communication and dissemination, and response capability.

### Suggestion on climate change issue

- **Rising Temperatures:** Communities are experiencing an increase in temperature. This trend needs to be monitored and addressed through appropriate climate adaptation strategies.
- **New Vegetation:** The introduction of new types of vegetation is occurring. This change should be studied to understand its impact on local ecosystems and agriculture.

<sup>91</sup> ancestral job which was to be delivering the message to the people about important dates and events by shouting out loud and visiting limited number of houses assigned to them

- **Declining Sparrow Population:** A noticeable decline in the sparrow population. Efforts should be made to investigate the causes and implement measures to protect these birds.
- **Drought and Water Shortages:** Due to drought, groundwater levels are dropping, and tube wells are drying out. It's crucial to develop water conservation strategies and identify alternative water sources to address this issue.
- **Soil and Land Erosion:** Sustainable land and soil management practices are essential. Special attention should be given to preventing soil erosion and land degradation to maintain healthy and productive land.

### **Identification and Analysis of Environmental and Social Impact**

The environmental and social impacts were assessed through discussions with stakeholders on project results, as well as through the review of relevant literature, publications, and field observations. Social impacts encompass changes in individuals' lifestyles, work dynamics, relationships, organizational affiliations, and societal roles resulting from an event. Hydrological status and outlook systems have broad applications across different scales. Given water's essential role in all aspects of life, these systems hold substantial potential to benefit multiple sectors including environment, industry, agriculture, public water supply, and energy<sup>92</sup>.

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<sup>92</sup>Hydrological Status and Outlooks. <https://www.ceh.ac.uk/sites/default/files/2021-11/sustainable-water-guide-chap6-hydrological-status-v2.pdf>

**Assessment of the general impacts through HydroSOS-BaNe project according to the stakeholder consulted.**

*Table 7 : Assessment of the Impacts*

Expected results of the project	Environmental Impacts		Social Impacts	
	Positive	Negative	Positive	Negative
Improved risk knowledge through risk map development and dissemination.	Major for reducing the flood and drought impacts on environment.	No negative impacts are foreseen	Major for reducing the impacts of flood and droughts on human-made surroundings.	
Bridging the gap in integrating knowledge about future scenarios (economic, urban, climate, etc.)			Essential for acquiring knowledge and increasing resilience.	
Risk management strategies incorporated into short, medium, and long-term development plans.	Major for the reduction of the environmental consequences	No negative impacts are foreseen	Major by minimizing social consequences, fostering a more equitable and healthy society.	
Enhanced forecasting tools for floods, droughts, and Early Warnings systems (EWS) with improved cross-border coordination to reduce disaster risks in vulnerable communities.	Major for contribute to long-term environmental sustainability and resilience of vulnerable communities.		Major for effective management of disasters, accuracy in EWS, ensured preparedness.	
Development of medium- and long-term adaptation and mitigation measures (both structural and non-structural) in priority areas, with updates based on lessons learned and monitoring tools.	Major for the increase of protection measures for watercourses and forests	Minor related with effect on land use planning and water resources management	Major for the reduction of the consequences of disasters on the biophysical environment, including all living and nonliving components	Minor for the management of the residual effects (relocation of communities) of the impacts if any
Raising awareness among vulnerable populations about hydro meteorological risks and promoting prevention, preparedness, response, and mitigation strategies through educational programs that utilize participatory solutions.	Enhanced community preparedness and response, which leads to substantial environmental protection and resilience.		Crucial for enhancing population resilience and understanding the true scientific causes of extreme events.	
Improved and tested tools for planning and operational mechanisms to ensure effective preparation and response to floods and droughts.	Major for the prevention of disaster management, ecosystem and resilience		Major for improving overall social cohesion and resilience against future disasters.	
Local and national, including weather and hydrological authorities, receive training in risk management and possess a clear understanding of their roles and coordination mechanisms	Major for the improvement of environmental monitoring and resource management		Major for enhancing the public safety and community resilience	
A collaborative process is established to ensure that these instruments and strategies are embraced by local communities and tailored to their specific contexts	Adoption and maintaining practices that protect and conserve the natural resources.		Major for stronger community cohesion, improve trust in institutions, and increase resilience to social challenges.	Minor because there is a risk of internal conflicts or one community receiving more benefits than other

### **Environmental and social impacts of the project**

A cross-analysis of the actions foreseen by the project and the field investigations at the level of the national parts of the GBM region, helped to identify positive and negative impacts of the project of integrated management of floods and droughts. Project activities analysis, consultation with different level of people and field observation in the targeted project areas in the GBM river basin helped find both positive and negative impacts of the HydroSOS-BaNe project. These impacts are environmental and social and are ranked positive or negative. The analysis of these impacts will help propose further mitigation measures.

#### **The positive impacts:**

- Build Institutional capacity to take the appropriate measures to reduce the vulnerability of the community in the targeted project areas
- Ensure accurate forecasting and early warning messages dissemination
- Lead time will be maintained for forecasting
- Develop effective coordination among the concerned departments and agencies.
- Develop various tools and techniques for risk mitigation through forecasting and early warning
- The Disaster Management Committee will play active role in early warning systems
- The entire community in the targeted areas will be able to receive timely early warning messages.
- **Building community capacity for timely disaster preparedness.**
- Reduce risks for marginalized and vulnerable people through their involvement in the project.
- Promote women's participation in the project to reduce their vulnerability.
- Help in managing water resources more effectively and also maintaining and restoring ecological balance by providing early warning
- It will empower communities with timely information and tools to prepare for and respond to floods or droughts, reducing potential loss of life and livelihoods
- Raises awareness about hydrological risks, fostering a culture of preparedness and adaptive behavior among the population

#### **The negative impacts:**

- A trust gap may emerge if the accuracy of forecasting messages is not maintained.
- May be failed short-mid- and long-term forecasting accurately
- Inaccurate forecasting may cause unacceptance by the community.
- Delays in forecasting for any reason may reduce its effectiveness for the community. Gaps in coordination among departments and agencies may slow down the process
- An inactive Disaster Management Committee creates barriers to reaching remotely located vulnerable groups.
- Resettlement following risk mapping may result in the loss of livelihoods for communities in identified risk areas. Overreliance on technology for forecasting could lead to neglect of traditional knowledge and practices related to water management

Overall, while the Hydrological Status and Outlook System offers significant benefits in terms of environmental sustainability and community resilience, careful implementation and consideration of local contexts are essential to mitigate potential negative impacts.

Table 8 : Identification and Analysis of Potential Environmental and Social Impacts by the HydroSOS-BaNe project in both Nepal and Bangladesh

Screening questions	Impact			
	Environmental		Social	
	Positive	Negative	Positive	Negative
<b>AF Principle 1: Compliance with the law</b>				
Compliance with the national laws, acts and policies.	Ensure compliance with all necessary national laws, acts and policies to ensure easy and timely project implementation. following the protocols, and procedures of the national and local governments in the two countries. Before implementation of the activities, a concept note or ToR will be shared with the stakeholders to check if there is any noncompliance with any laws, acts and policies Following the agreement, implementation of the activities will be carried out	There are no negative impacts foreseen	Safeguard the rights, livelihoods, and well-being of communities at risk.	
<b>AF Principle 2: Access and equity</b>				
Access all community members to the early warning messages.	The project will ensure representatives of all vulnerable groups will participate in all training and workshops and will share the knowledge gained with their communities.	Considering the limited budget, it might be possible that some individuals are not able to participate. The project will request trained individuals of the community to share knowledge with others	Ensured peoples participation, cohesion and collective approaches to protect lives and livelihoods.	
<b>AF Principle 3: Marginalized and vulnerable groups</b>				
Including the marginalized and vulnerable groups, in the planning and implementation.	This project will enhance community preparedness, reduce losses, and protect biodiversity.	Difficulty may arise as the groups will have insufficient knowledge and access to technological devices and methodology	The real needs about livelihoods, resiliency will be focused and develop as per plan accordingly.	
<b>AF Principle 4: Human rights</b>				
Potential human rights issues associated with the project.	This project will not undertake any direct activities that impact human rights issues. However, human rights issues will be addressed through project activities implemented during disasters. All human right laws (freedom of speech, access to information etc.) will be upheld during project implementation		Basic human rights including access to food, shelter and information will be facilitated during the impending period.	
<b>AF Principle 5: Gender equality and women empowerment</b>				

Screening questions	Impact			
	Environmental		Social	
	Positive	Negative	Positive	Negative
Impact of women's participation in decision-making processes	Gender equity, leadership, women's empowerment, and ownership will be promoted through various activities, such as gender mainstreaming in flood management and community-based initiatives. These efforts will help protect society and ecosystems.	In Bangladesh, participation of women might be limited due to restricted cultural norms. As much as possible women staff will be employed in the project to engage women of the communities in decision-making and implementation of the activities	Ensure the identification and addressing of real women's issues to reduce losses and promote social harmony and peace.	Women's participation in disaster preparedness and decision-making is often limited due to cultural and social norms, as well as a lack of technological knowledge and reluctance to learn.
<b>AF Principle 6: Conservation and biodiversity</b>				
Reduce the threats to biodiversity in the ecosystem of the project.	The indirect impact of the devastation will be reduced by early warning messages, which will help mitigate threats to biodiversity in the project's ecosystem. Risk maps will provide information on protected and wetland areas that could be preserved for managing flooding and drought events		Supporting livelihoods, food, and culture and enhance the resilience of the community.	
<b>AF Principle 7: Climate change</b>				
Potential climate change impacts during its implementation period	The project does not have activities that harm the environment; instead, it focuses on enhancing the community's adaptation capacity and resilience by providing information, implementing adaptative measures (raising of houses, agriculture practices, alternative livelihoods etc.) and trainings		Build capacity of local communities on climate change adaptation that enhance the productivity and income generation.	
<b>AF Principle 8: Pollution prevention and efficient use of resources</b>				
Pollution prevention and efficient use of resources	Project doesn't have any activity to pollute any areas. However, pollution management and mitigation measures will be increased through awareness.		Enhanced community health and safety as pollution risks are identified and mitigated.	
<b>AF Principle 9: Protection of the natural habitats</b>				
Natural habitats that could be affected by the project.			Strengthened community engagement in habitat	

Screening questions	Impact			
	Environmental		Social	
	Positive	Negative	Positive	Negative
	There is no project activity that will affect natural habitats. The project will focus on awareness building to enhance conservation efforts.			protection and restoration efforts.
<b>AF Principle 10: Public health</b>				
Public health issues that could arise from the project activities and have environmental and social impact?	The project does not involve any health hazardous or public health-related activities. Disease incidence will be reduced through health awareness activities.		Building awareness of best practices for health-related safety delivering messages on health and hygiene issues during disasters.	
<b>AF Principle 11: Cultural and physical heritage</b>				
Minimize the impact on cultural and physical heritage sites due to flood or drought.	The project doesn't have any activity that could affect the cultural and physical heritages, rather the community awareness will raise on the importance of heritages.		Project activities will be supportive for the preservation of Cultural identity and history.	
<b>AF Principle 12: Involuntary resettlement</b>				
Impacts of identifying the communities that are likely to be affected by involuntary resettlement.	Normally no direct resettlement activities will occur but after risk mapping for the implementation of better plan for safety and security, so communities might have to be resettled	Minor to disruption of local ecosystems, biodiversity, and natural habitats and community cohesion.	Resettled community will get safe location with alternative livelihoods options.	Minor for loss of land and income generation activities.
<b>AF Principle 13: Indigenous peoples</b>				

Screening questions	Impact			
	Environmental		Social	
	Positive	Negative	Positive	Negative
Rights of indigenous peoples are respected and protected during our project.	The rights of indigenous peoples can help conserve their traditional lands, ecosystems, and natural resources through their participation and traditional knowledge.		Protection of the rights, traditional knowledge, social inclusion, cultural preservation for the indigenous people and will also help in enhancing resilience.	
<b>AF Principle 14: Core labour rights</b>				
Compliance with the countries designated labour laws	Labor laws that guarantee fair wages and provide financial protections making them less vulnerable to the economic shocks of disaster.		Access to resources, financial aid, and technical assistance these farmers will be ensured.	
<b>AF Principle 15: Land and soil conservation</b>				
Conserve land and soil in the face of flood or drought conditions associated with the project.	Implementing land and soil conservation practices can significantly enhance resilience to flood and drought conditions, reducing soil erosion and improving water retention.		These conservation practices stabilize farm production during extreme weather, ensuring food security and livelihoods.	
<b>Additional Screening Questions for Cost-Effectiveness Measures</b>				
Cost-effectiveness of the Early warning systems, community-based activities, and risk maps/	Methods like early warning systems and risk maps typically involve using existing natural features and systems (like rivers or weather patterns) more effectively.		Engaging communities empowers them to understand and effectively respond to climate risks, promoting resilience and adaptive capacity.	

### Mitigation and Enhancement of the Identified Impacts

The impacts identified above in the light of the implementation of the project should be accompanied by mitigation (for negative impacts) actions and enhancement (for those positive). The following table provides a proposal of these measures in terms of each impact.

Table 9 : Mitigation and enhancement of the impacts

Item	Impacts	Impact Type	Mitigation /enhancement actions	Responsibility (WMO, National agencies, local or community)
1	Inaccuracy and delay forecasting and warning messages dissemination.	Negative Minor & Indirect	<ul style="list-style-type: none"> <li>- Numerical calculation for three days lead-time accuracy is possible but accuracy for mid and long term can be possible through probabilistic rainfall forecasting.</li> <li>- Institutional capacity building in forecasting and early warning message dissemination systems.</li> <li>- Establish rainfall trigger thresholds tailored to the specific hydrological and environmental conditions of an area, improving the accuracy and effectiveness of flood forecasting and early warning systems.</li> </ul>	<ul style="list-style-type: none"> <li>- Bangladesh Meteorological Department (BMD) and Bangladesh Water Development Board</li> <li>- Department of Hydrology and Meteorology Nepal</li> </ul>
2	Poor changes of the people of drought prone areas		<ul style="list-style-type: none"> <li>- By using both Standardized Precipitation Index (SPI) and the Standardized Precipitation Evapotranspiration Index (SPEI) can be used for drought monitoring.</li> <li>- Development of inlet and outlet water flow</li> </ul>	<ul style="list-style-type: none"> <li>- Bangladesh Meteorological Department (BMD)</li> <li>- Department of Hydrology and Meteorology Nepal</li> </ul>
3	Warning messages are not understandable.	Negative Minor & Indirect	<ul style="list-style-type: none"> <li>- Introduction of locally based danger level for forecasting systems</li> <li>- Develop apps with the help of google to send SMS alerts to the persons informing the water level of their areas.</li> </ul>	<ul style="list-style-type: none"> <li>- Flood Forecasting and Warning Centre (FFWC)</li> <li>- Bangladesh Water Development Board (BWDB)</li> <li>- Department of Hydrology and Meteorology Nepal</li> <li>- Local Government and community</li> </ul>
4	The marginalized groups will have insufficient knowledge and access to technological devices.	Negative Minor & Indirect	<ul style="list-style-type: none"> <li>- To avoid the exclusion of marginalized and vulnerable communities, local radio channels and traditional practices will be implemented to reach these groups especially women, girls, elderly, physically challenged individuals.</li> </ul>	<ul style="list-style-type: none"> <li>- Flood Forecasting and Warning Centre (FFWC)</li> <li>- Bangladesh Water Development Board (BWDB)</li> <li>- Department of Hydrology and Meteorology Nepal</li> <li>- Local Government and community</li> </ul>
5	Women participation to disaster preparedness and decision making is often limited due to cultural and social norms.	Negative Minor & Indirect	Women facilitator will be engaged to bring the women in focus.	<ul style="list-style-type: none"> <li>- Union Disaster Management Committee (UDMC)</li> <li>- Department of Hydrology and Meteorology Nepal</li> <li>- Local Government and community</li> </ul>
6	Limited community access to warning messages	Negative Minor & Indirect	<ul style="list-style-type: none"> <li>- Apps should be used to send the voice alerts to the vulnerable community for preparedness.</li> <li>- Build capacity of some community people than they will be responsible for further dissemination</li> <li>- Activation of the Disaster Management Committee to use the human resources in dissemination process.</li> </ul>	<ul style="list-style-type: none"> <li>- Bangladesh Meteorological Department (BMD)</li> <li>- Union Disaster Management Committee (UDMC)</li> <li>- Department of Hydrology and Meteorology Nepal</li> <li>- Local Government and community</li> </ul>

7	Coordination gap among the implementing entities, other departments of the countries and regional data sourcing agencies	Negative Minor & Indirect	<ul style="list-style-type: none"> <li>- Strengthen coordination among the agencies for quick decision and execution.</li> <li>- Strengthening collaborative relationship for data sourcing from neighbor countries</li> <li>- Formation of national and regional level advisory platform.</li> </ul>	<ul style="list-style-type: none"> <li>- Bangladesh Meteorological Department (BMD)</li> <li>- Bangladesh Water Development Board (BWDB)</li> <li>- NDRRMA, Nepal</li> <li>- Department of Hydrology and Meteorology Nepal</li> <li>- Local Government and community</li> </ul>
8	Less involvement of women in the warning messages dissemination process.	Negative Minor & Indirect	<ul style="list-style-type: none"> <li>- Provide motivational training by female trainer to increase the number of women engagements.</li> </ul>	<ul style="list-style-type: none"> <li>- Department of Hydrology and Meteorology Nepal</li> <li>- Local Government and community</li> </ul>
9	Reduction of the vulnerability of the people living in the GBM river basin population	Positive- Direct	<ul style="list-style-type: none"> <li>- Promote project methodologies and tools for the other part of the countries (region outside of the GBM Basin)</li> <li>- Training and information gathering of the actors for the post-project evaluation.</li> </ul>	<ul style="list-style-type: none"> <li>- Bangladesh Meteorological Department (BMD)</li> <li>- Bangladesh Water Development Board (BWDB)</li> <li>- Department of Hydrology and Meteorology Nepal</li> <li>- Local Government and community</li> </ul>

**Table 10: Checklist Of Adaptation Fund's 15 Principles in relation to the HydroSOS-BaNe project**

AF's Environmental and Social Policy	No Further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
Compliance with the law		<p>Risks: Low Impact: Low</p> <p>During the EIA and SIA processes, stakeholders stated that the project will ensure compliance with national laws and guidelines for the GBM River Basin during the implementation of adaptation measures and capacity-development activities. No prior environmental or construction permits are needed as no physical or structural constructions are planned. However, for the installation or rehabilitation of the hydrological and meteorological stations or warning systems at local levels, screening of laws or acts will be carried out to adhere to the requirements necessary for the safe installation and protection of infrastructure. If required international laws on data sharing protocol among different countries will be consulted and agreed upon with the stakeholders.</p> <p>Risk Mitigation and management measures: Before implementing any activity, the concept notes, or Terms of Reference (ToR) will be shared with stakeholders to check if there is any noncompliance with any laws, acts and policies. Following the agreement with the national and regional stakeholders, implementation of the activities will be carried out. If any potential risks or impacts are identified during the implementation phase, risks prevention or management strategies will be executed as presented under the ESMP provided in Annex 3.</p>

AF's Environmental and Social Policy	No Further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
		In case installation or rehabilitation of meteorological and hydrological stations is required in forest areas of Nepal, a Brief Environmental Study will be conducted in accordance with the EPR 2020.
Access and Equity		<p>Risks: Low Impact: Low</p> <p>The project design has been developed to allow representatives from all groups to participate in every capacity development training/workshop at local levels. However, only a small percentage of community members will be able to participate in the project's capacity-development activities. The project will ensure that these community representatives disseminate information to wider groups. Selected participants will be expected to share their training knowledge with other community members and organizations to ensure fair and equitable access to project benefits for all. The selection of participants/beneficiaries will also be made in consultation with local practices, traditions and access to social facilities.</p> <p>Risk Mitigation and management measures: Before implementing any activity, the concept notes or Terms of Reference (ToR) will be shared with stakeholders to identify all the relevant participants to join the capacity development and other activities. Women and other vulnerable groups will be encouraged to participate in various activities and decision-making processes. For any recruitment, application from women candidates will be encouraged and preferred. Pilot testing in each country will provide opportunities to involve all stakeholders, including vulnerable groups, in accessing tools, developing knowledge and skills, and strengthening their resilience to climate-change events. If any potential risks or impacts are identified during the implementation phase, risk-prevention or management strategies will be executed as outlined in the ESMP.</p>
Marginalized and Vulnerable groups		<p>Risks: Low Impact: Low</p> <p>The project will contribute to the reduction of existing inequalities for EWS for floods and drought, particularly those affecting marginalized or vulnerable groups dependent on agriculture or living in urban areas. The EWS system for floods and droughts will be available through technological sources, but the accessibility to the warning services will be provided to all vulnerable populations. During the pilot testing, the members of communities (including marginalized and vulnerable groups) and local agencies will be provided with adequate knowledge and explanations about the systems to use it for their own benefits.</p> <p>Community-based flood and drought management activities including gender mainstreaming will support the participation of marginalized and vulnerable groups and their appropriation of projects benefits.</p>

AF's Environmental and Social Policy	No Further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
		<p>It was described by the FGD participants during public consultation that the vulnerable and marginalized groups will have insufficient knowledge and access to technological devices such as mobile phones or lack of good cellular connectivity. This risk will be overcome developing tools, technology and strategy adhering to local knowledge and capacities.</p> <p>Risk Mitigation and management measures: During the design of the EWS, several consultations are planned with the stakeholders to understand their needs and capacities. The project team will ensure all stakeholders are consulted during planning of every activity being implemented. To avoid the exclusion of marginalized and vulnerable communities in warning communications, local radio channels and traditional practices will be implemented to reach these groups especially women, girls, elderly, physically challenged individuals. In case of any potential risks and impacts are identified during implementation phase, risks prevention or management strategies will be executed as presented under the ESMP.</p>
Human Rights		<p>Risks: Low Impact: Low</p> <p>The issue was discussed with the stakeholders and all agreed that there is no activity under this project that could violate the human rights of the community people of the targeted areas. The project will promote the basic human rights, extend supports to get the access to basic needs and information. The IE and EEs partners affirm the fundamental human rights of all people. In compliance with laws, regulations, and acts, the project ensures that its operations and all associated activities fully adhere to established human rights principles. The project will ensure that a description of the legal and regular frameworks will be required for all interventions to ensure compliance is met throughout the implementation of the project. In case of any potential risks and impacts are identified during implementation phase, risks prevention or management strategies will be executed as presented under the ESMP. However, there is a possibility of participation of only specific groups of people in the capacity development activities due to the prior involvement or consultation, authoritative personality and access to the location, availability and language barriers.</p> <p>Risk Mitigation and Management measures Before implementation of any activity, concept note, or Terms of Reference (ToR) will be shared with the stakeholders to check for the potential participants from all groups to join the project activities. As much as possible, participation of the stakeholders from all the groups will be prioritized in the project activities. Sharing of experiences and knowledge from the beneficiaries to other stakeholders will be prioritized.</p>

AF's Environmental and Social Policy	No Further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
Gender Equality and Women's Empowerment		<p>Risks: Low Impact: Low</p> <p>The importance of women's empowerment, leadership and participation were emphasized by the stakeholders during EIA and SIA study. It was recommended by the stakeholders in the KII and FGD that women's participation in disaster preparedness and decision-making is often limited due to cultural and social norms especially in Bangladesh. So, planning participatory activities will ensure that women and representatives of women's associations are sufficiently well represented. The proposed project will improve gender equity and women's empowerment through providing capacity building training under different planned activities. The proposed project will improve the gender equity and women empowerment through the WMO developed tool: Training Manual for mainstreaming gender in end-to-end Early Warning system for Flood forecasting and integrated Flood Management through a participatory design approach. This will help in increasing the participation of women, girls and other vulnerable groups in Flood and Drought management activities as well as decision making processes. Also, the activities related to risk maps and early warning system will be developed in an inclusive and participatory manner ensuring data collection for vulnerabilities are dis-aggregated by sex. The warning information are tailored to the needs of the population especially considering women, children, elderly, youths etc. Women representatives will be involved in the design, organization and implementation of activities especially in training workshops, meetings, update or review of policies and plans etc. so that they are empowered with knowledge, skills and tools for preparedness and resilience. The trained women will play active role in strengthening the community preparedness and decision-making processes.</p> <p>Risk Mitigation and management measures: The project will implement the gender responsiveness action plan provided under Annex 4 to support any gender-specific needs and roles in the project implementation. If there are any risks identified, the ESMP will be utilized for gender responsiveness action to mitigate or minimize the risks.</p>
Core Labour Rights		<p>Risks: Very Low Impact: Low</p> <p>During the discussion of the labour rights issue in the EIA and SIA processes the stakeholders stated that the project will be implemented and managed in compliance with the country's designated labor laws. Child labor will be forbidden both within the organization and other project partners. However, during hiring of national and local experts for development of risk maps, EWS and other measures, preference might be given to male candidates due to limited scientific knowledge and experience (related to Hydrology and Meteorology) in female candidates in the two countries.</p> <p>Risk Mitigation and management measures:</p>

AF's Environmental and Social Policy	No Further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
		<p>In ToRs, preference will be provided to female candidates with similar background and experiences and where possible, candidates with closely linked background to hydrology and meteorology will be hired and trained where necessary. In case of any potential risks and impact identified during the implementation phase, risks mitigation or management strategies will be executed as presented under the ESMP.</p>
Indigenous Peoples		<p>Risks: Low Impact: Low</p> <p>During the EIA and SIA process, stakeholders stated that the indigenous population in the region would be consulted and involved in the design and implementation of project activities. The traditional knowledge of indigenous people on flood and drought will be valuable. The FGD and KII mentioned that the strategies include participation, training, equitable benefit-sharing mechanisms, will ensure compliance with indigenous peoples' issues.</p> <p>In case of any potential risks and impact identified during the planning and implementation phase, a built-in safeguard approach for risks prevention or management strategies will be executed as presented under the ESMP</p>
Involuntary Resettlement		<p>Risks: Low Impact: Medium</p> <p>There are no activities proposed in the project which will create direct involuntary resettlement of communities. However, the risks of displacement of the population after the mapping of flood and drought risk areas could be possible as some of these areas may be classified as high-risk zones loss of life. On the basis of evidence-based and scientific information, the agencies will propose new prevention plan to prohibit future settlement in the high-risk areas.</p> <p>Risks Mitigation and management measures: A resettlement plan must be formulated by the relevant governmental agency if any resettlement occurs. A safeguards approach will be established to minimize the negative effects of involuntary resettlement. Affected populations will be informed of their rights, aware of grievance mechanisms, consulted on options, and offered resettlement alternatives or fair compensation. If any potential risks or impacts are identified during the implementation phase, risk-prevention or management strategies will be executed as outlined in the ESMP.</p>
Protection of the Natural Habitats	X	<p>Risks: N/A Impact: No impact anticipated</p>

AF's Environmental and Social Policy	No Further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
		<p>KII and FGD participants in the stakeholder consultations mentioned that there are no potential direct risks to ecosystems, natural habitats, or biological diversity from the project activities. Existing and new policies, plans, and activities to protect natural habitats will be reviewed with stakeholders to ensure the legal protection of critical habitats. If any potential risks or impacts are identified during the implementation phase, risk-prevention or management strategies will be executed as outlined in the ESMP.</p>
Conservation and Biological Diversity	X	<p>Risks: N/A Impact: No impact anticipated</p> <p>Various stakeholders consulted during the preparation of the EIA and SIA studies stated that there are no direct risks to biodiversity conservation, as the project does not involve interventions in natural resources or the introduction of new species. However, it may lead to changes in agricultural and irrigation practices, as well as pesticide use, to improve production. The project will promote biodiversity conservation activities, such as reforestation and nature-based solutions, through assessments at pilot sites in collaboration with national agencies. It will also promote capacity building and peer learning to enhance the effective management of natural resources, including aquatic species, animals, and forests. In case of any potential risks and/or impacts are identified during the implementation phase, risks prevention or management strategies will be executed as presented in the ESMP.</p>
Climate Change	X	<p>Risks: N/A Impact: No impact anticipated</p> <p>During the EIA and SIA processes, stakeholders indicated that no project activities would cause greenhouse gas emissions or involve deforestation, and therefore, the project will have no negative impact on climate change. Additionally, the project will enhance local flood and drought resilience and improve governance, policies, and plans for climate change adaptation at both national and regional levels.</p> <p>Furthermore, the project not only increases the flood and drought adaptation capacity and resilience of the local population but also contributes to developing better governance structures, policies and plans at both national and regional levels for climate change adaptation. Community resilience will be enhanced through the awareness building activities and additional support for agricultural and income generating activities for the poor communities.</p> <p>In case of any potential risks and impacts are identified during the implementation phase, risks prevention or management strategies will be executed as presented under the ESMP.</p>

AF's Environmental and Social Policy	No Further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
Pollution Prevention and Resource Efficiency	X	<p>Risks: N/A Impact: No impact anticipated</p> <p>During the stakeholder consultations conducted as part of the EIA and SIA processes, it was found that no project interventions are expected to result in water, air, or soil pollution. The project will strengthen technical and organizational capacities for the rational use of water at both national and transboundary levels with clear guidelines, policies, and action plans.</p> <p>In case of any potential risks and impacts are identified during the implementation phase, risks prevention or management strategies will be executed as presented under the ESMP.</p>
Public Health	X	<p>Risks: N/A Impact: No impact anticipated</p> <p>According to the EIA and SIA findings it is mentioned by all concerned stakeholders that the project activities should not negatively impact public health. Instead, they will help prevent natural disasters and improve access to health and sanitation facilities. However, population displacement due to disasters (during the implementation) could lead to epidemics resulting from poor hygiene or sanitation.</p> <p>Risks Mitigation and management measures: A safeguard approach through knowledge and awareness during the community-based flood management activities will be carried out to inform the population about proper hygiene and sanitation. The project will identify flood-prone communities and raise awareness of health-related safety during capacity-building activities. It will also regularly inform and educate the population about diseases associated with floodwater, such as malaria, typhoid fever, amoebiasis, and cholera.</p> <p>Affected populations will be informed of their rights, aware of grievance mechanisms and possible support. In case of any potential risks and impacts are identified during implementation phase, risks prevention or management strategies will be executed as presented under the ESMP.</p>
Physical and Cultural Heritage	X	<p>Risks: N/A Impact: No impact anticipated</p> <p>During the stakeholder consultations conducted as part of the EIA and SIA processes, it was stated that the project does not include any activities that could affect physical or cultural heritage. The participatory design and mapping approach will involve local communities and authorities to identify areas of physical and cultural significance and ensure that community-based flood and drought management activities will not negatively impact them.</p>

AF's Environmental and Social Policy	No Further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
		In case of any potential risks and impacts are identified during the implementation phase, risks prevention or management strategies will be executed as presented under the ESMP.
Lands and Soil Conservation	X	<p>Risks: N/A  Impact: No impact anticipated  The project is not expected to lead to any negative impacts to land and soil conservation.</p> <p>The project will promote soil and land resource conservation, focusing on natural and environmentally friendly solutions as part of the community-based activities. The project aims to enhance agricultural practices and strengthen the capacity of farmers and technicians to cope with the climate change events and build resilience through socio-economical activities. In case of any potential risks and impacts are identified during the implementation phase, risks prevention or management strategies will be executed as presented under the ESMP.</p>

## Environmental and Social Management Plan (ESMP) Report

### CHAPTER 1: BACKGROUND

The Environmental and Social Management Plan (ESMP) is a vital part of the project's management framework. It is developed from the Environmental and Social Impact Assessment (ESIA) findings to effectively manage and reduce potential identified environmental and social risks which might arise during the planning and implementation of the project activities. This strategic plan establishes standard procedures for resolving any impacts ensuring equitable, timely and sustainable development, regulatory compliance, and safeguards the well-being of impacted communities and ecosystems. It also supports the mitigation or management of impacts from extreme events like floods and droughts on vulnerable households and environmental degradation.

#### 1.1 Description of the project

##### 1.1.1 Situation in the targeted project countries

Serious problems of flooding and drought are increasingly recurrent in Bangladesh and Nepal in the Ganga Brahmaputra Meghna (GBM) river basin in a context of variability and persistent climate changes. These natural disasters negatively impact the population with material damage to property and loss of life. The assessment of gaps for capacity-building at the transboundary level shows the need to improve and complete adaptation plans, strategies, investments in policies, and measures on the threats due to climate change, particularly floods and drought. In light of the needs expressed by Bangladesh, it became imperative to proceed with drafting a project proposal to be submitted for funding to the Adaptation Fund (AF).

##### 1.1.2 Project objectives

The overall objective of the project 'HydroSOS-BaNe' is to strengthen the capacity of adaptation and resilience of communities and agencies towards the impact of climate change with integrated flood and drought management.

##### 1.1.3 Specific Objectives of the Assessment

Helping in the implementation of joint and coordinated measures to improve the development of the social and economic environment through a mapping of risks of floods and drought and future scenarios for the variability and climate change.

Support stakeholders in the basin in the development of integrated end-to-end early warning systems against floods and droughts as well as activities of capacity-building for climate adaptation measures and mainstreaming gender.

Provide policy and management guidance by sharing scientific information, knowledge and best practices for integrated disaster risk reduction and climate adaptation in the basin.

##### 1.1.4 Environmental and social policy of the Adaptation Fund

The Adaptation Fund (the Fund) finances projects and climate adaptation programs benefiting vulnerable communities in developing countries that are Parties to the Kyoto Protocol. Its environmental and social policy aligns with sustainable economic and social development, emphasizing environmentally sound management of natural resources. Similarly, the gender policy (GP) promotes gender mainstreaming to ensure equal opportunities for women and men in building resilience, addressing differentiated vulnerabilities, and adapting to climate change impacts. The environmental and social assessment for the GBM river Basin project adheres to these principles and the 15 principles of the Fund's environmental and social policy.

##### 1.1.5 Political, legal and institutional framework

Environmental and social impact studies (ESIA), including the ESRMP, are mandatory in the six riparian countries of the GBM river basin, aligning with national environmental and social management policies. The ESMP complies with current legislation requiring environmental assessments for projects with potential negative impacts. Managing the GBM river basin project involves coordination with various stakeholders, including ministries of environment, civil protection, agriculture, and water resources, as well as national meteorological agencies, local authorities, organizations, associations, and NGOs in the project area.

### CHAPTER 2: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

#### 2.1 Introduction

The Environmental and Social Management Plan (ESMP) is a critical part of our project's framework, developed from the Environmental and Social Impact Assessment (ESIA) to manage and mitigate environmental and social risks. It ensures sustainable development, regulatory compliance, and protects communities and ecosystems. The ESMP, aligned with Adaptation Fund principles, addresses impacts from extreme events such as floods and droughts on vulnerable households and the environment.

##### 2.2 Objectives of the Environmental and Social Management Plan (ESMP)

The Environmental and Social Management Plan (ESMP) is designed to achieve a set of strategic objectives that align with the principles of sustainable development, regulatory compliance, and stakeholder engagement. The key objectives of the ESMP are as follows:

Identify potential environmental and social impacts associated with the project's activities.

Develop and implement mitigation measures to prevent, reduce, or manage adverse environmental and social impacts.

Raise awareness of environmental and social risks among stakeholders.

Establish robust monitoring systems to track the implementation and effectiveness of mitigation measures.

Promote and provide means for adequate stakeholder engagement.

Implement a grievance redress mechanism to address stakeholder concerns and complaints in a timely and effective manner.

### **2.3 Methods applied in the preparation of the ESMP**

The HydroSOS-BaNe Project used a participatory approach, consulting all stakeholders. Data collection included public consultations in flood-prone and drought-prone areas of Bangladesh and Nepal, using semi-structured checklists. Various community members, including local leaders, NGO personnel, teachers, religious figures, indigenous people, and organizational representatives, were involved, with a focus on minorities and vulnerable groups. Key Informant Interviews (KIIs) were also conducted with specialists from key agencies. This approach, involving four public consultations and seven KIIs, laid a strong foundation for developing the Environmental and Social Risk Management Plan, ensuring diverse perspectives and local knowledge were considered.

Table 11: Environmental and social context and basic conditions

A portion of the GBM basin	Risks exposure	Livelihoods / social system	Ecosystems and other environmental resources
Burungamari Upazila, and Nageswari Upazila under Kurigram district, Bangladesh	Flood	Low capacity and access to early warning information, high levels of poverty, poor agricultural practices, inadequate enforcement of environmental laws, etc.	Ecosystems include riverine ecosystems, floodplain wetlands; seasonal water bodies (Wetlands) riparian forests and grasslands. Environmental resources include fertile alluvial soil, diverse fish species, migratory bird habitats, aquatic vegetation, freshwater sources, etc.
Godagari Upazila, and Tanore Upazila under Rajshahi district, Bangladesh	Drought	Extensive agriculture and breeding, low capacity and access to early warning information, high level of poverty, poor agricultural practices Inadequate enforcement of environmental laws, etc.	Ecosystems include dry deciduous forest, Barind Tract ecosystem, scrubland, grassland and agricultural land. Other environmental resources include groundwater aquifers, drought-resistant vegetation, soil with high clay content, mineral deposits, limited surface water bodies, etc.
Kankai (Jhapa)	Flood and Drought	The region of Kankai (Jhapa) has vulnerable populations which experienced both flash and riverine flooding. It has fertile terai plains bordering India.	Generally flat land in the Terai with the Siwaliks on the north, Place is natural habitat of Shorearobusta; Acacia catechu, Dalbergiasissoo and other riverine forests and grasslands, The acacia catechu-dalbergiasissoo forest is found on newly deposited alluvium, often gravelly along streams and rivers. The other riverine forest consists of tropical evergreen forest dominated by syzygiumcumini (black plum) tropical deciduous forest usually dominated by Bombaxceiba (simal), Holopteliaintegriifolia (cheptepagro) and Trewianudiflora (pindar) species
Tamakoshi River (Dolakha)	Transboundary and GLOF	This river in Dolakha region is a transboundary river with China. This site is useful for testing of potential GLOF events. This region has frequent landslides, flooding and risk of GLOF	area is mostly middle mountains and hill which is rich in timber and other natural resources. Rhododendron species, and Quercus species are the common tree species of this district. Muntiacus muntjak, Panther parades, Ursus thibetanus, Capricornis sumatraensis, and Naemorhedus goral are some common wildlife species which are commonly found in this district

## CHAPTER 3: POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION MEASURES

Environmental and social impact assessments (ESIAs) are critical processes in the planning and implementation of any project, particularly those with the potential to affect the natural environment and local communities. These assessments aim to identify, predict, and evaluate the possible impacts of projects and propose measures to mitigate negative consequences.

Table 12: Potential Environmental and Social Impacts and Mitigation Measure

Item	Impact	Mitigation measures	Entities Charge in	Implementation site	Entity of monitoring	Tracking indicator	Budget proposed or required
<b>Potential Environmental Impacts and Mitigation Measures</b>							

1	Poor access to forecasting and warning message.	Provide capacity building training to a group of people, who will then share their knowledge with others.	BMD and BWDB DHM, MOHA	GBM river basin	BMD, BWDB, DHM and WMO	List of participants	10,000
2	Limited women participation due to cultural and social norms	Provide training on women empowerment to ensure planning and decision making.	Resource persons project, BMD and BWDB, DHM	GBM river basin	BMD, BWDB, DHM and WMO	List of participants	6,000
3	Indirect involuntary resettlement.	The population will be informed of their rights, aware of grievance mechanisms, consulted on options, and fair compensation.	BMD and BWDB, DHM	GBM river basin	BMD, BWDB, DHM and WMO	List of participants	10,000
4	Change in agricultural and irrigation pattern.	Provide technical services and capacity building training for farmers, fisherman etc.  Specific advisory should be provided to various local stakeholders from Meteo and hydro agencies	Resource persons project, BMD and BWDB, DHM	GBM river basin	BMD, BWDB, DHM and WMO	List of participants	15,000
5	Poor hygiene and sanitation after disaster.	Build awareness on water borne disease. Include this aspect in community-based flood management activities  Also, on national and location disaster management plan	Resource persons project, BMD and BWDB and DHM	GBM river basin	BMD, BWDB, DHM and WMO	List of participants	3,000
6	Underutilization of women's environmental knowledge and skills.	Taking skill Development initiatives for women, and creating equal Opportunities for women and men	Resource persons project, DHM BMD and BWDB	GBM river basin	BMD, BWDB. DHM and WMO	List of participants	6,000
	Total budget requested or covered						50,000

## CHAPTER 4: MONITORING AND FOLLOW UP PROGRAMME

World Metrological Organization (WMO), Bangladesh Meteorological Department (BMD) and Bangladesh Water Development Board (BWDB) will be responsible for overseeing the implementation of the Environmental and Social Management Plan (ESMP) across the project levels. These institutions will receive support from various national authorities for environmental and social protection.

A monitoring and evaluation (M&E) system will be developed to support the implementation and decision-makers in designing, implementing and adjusting program activities. The M&E arrangements will be structured and organized at local, national and regional or transboundary levels. The implementation of ESMP activities is incorporated into the project's overall monitoring and evaluation framework, with associated costs included in the project budget. Monitoring activities are based on updated checklists with the local, national and regional project progress reports through semi-structural interviews or focus-group discussions, field visits consultation, and technical activity reports.

## CHAPTER 5: INSTITUTIONAL FRAMEWORK FOR THE IMPLEMENTATION OF THE ESMP

*Table 13: Institutions involved in the implementation of the ESMP*

<b>Actors involved</b>	<b>Responsibility for risk identification and monitoring</b>	<b>Supporting entity</b>	<b>Responsibility for implementing measures</b>
World Meteorological Organization on (WMO)	WMO oversees project implementation and coordination. It develops Environment and Social Management Systems (ESMS) to identify environmental and social risks in compliance with the Environmental and Social Policy (ESP) of the Adaptation Fund (AF) and national laws. Before project activities begin, ESIA and ESMP are prepared. These assessments and plans are regularly monitored and disseminated, including a grievance mechanism for the project.	External Consultants, other executing agencies, and national environment and social agencies.	Ensure safeguard actions are defined in compliance with the national regulations and implemented for the activities which can create social and environmental risks. Supervise the implementation of the response activities under the ESMP coordination with the bodies responsible for the management of water, environment and social welfare. Monitor the progress of the risk-minimizing actions or measures with the executing partners.
Bangladesh Meteorological Department (BMD)	BMD is the national project execution and monitoring entity. BMD will implement the technical activities through local agencies, NGOs and private partners forming a network of technical support groups. They will support the study, prepare the contact lists of people, arrange inception and validation meetings and aware the stakeholders on ESIA and ESMP.	Other executing agencies, and national environment and social agencies	Follow-up of the study and implementation of the activities of the ESMP about the bodies responsible for the management of water and environment and monitor the progress of the risks minimizing action.
Bangladesh Water Development Board (BWDB)	BWDB is the project execution and monitoring entity. BWDB is responsible for the execution of the project activities and disseminates flood forecasting and early warning messages. They will support the study, prepare the	Other executing agencies, and national environment and Social agencies	Follow-up of the study and implementation of the activities of the ESMP about the bodies responsible for the management of water and environment and monitor the progress of the risks minimizing action.

	contact lists of people, arrange inception and validation meetings and aware the stakeholders on ESIA and ESMP. Flood Forecasting and Warning Centre (FFWC) of Bangladesh Water Development Board (BWDB) will collect hydrological data from 109 water level stations and 74 rainfall stations to provide flood warnings. FFWC is involved in the preparation of flood status reports at the national level. Based on the report they disseminate flood early warning to the stakeholders.		
Department of Hydrology and Meteorology	<p>The main objective of DHM is to collect, process, publish, and disseminate hydrological and meteorological data across Nepal. This data supports water resource planning, development, and research, and verifies extreme events. DHM aims to aid the country's overall water resource development and provide timely information to save lives and property during extreme events.</p> <p>Mandated by the Government of Nepal, DHM monitors river hydrology, water quality, sediment, limnology, snow hydrology, glaciology, weather, climate, agro-meteorology, air quality, and solar energy. It provides general and aviation weather forecasts, issues periodic climate bulletins, and generates agrometeorological notices for the Agriculture Management and Information System (AMIS). During the monsoon season, DHM offers 24/7 flood forecasting and early warning services to the public and related agencies.</p>	Other executing agencies, and national environment and Social agencies	Follow-up of the study and implementation of the activities of the ESMP about the bodies responsible for the management of water and environment and monitor the progress of the risks minimizing action.
Local governments and community groups	Local governments and community groups play crucial roles in risk identification and monitoring. Local governments are responsible for conducting comprehensive risk assessments, developing and maintaining hazard maps, and collecting and analyzing data on historical disaster events to understand risk patterns and trends. They must also establish and maintain early warning systems to alert communities of impending hazards. Community groups, on the other hand, support these efforts by providing local knowledge, participating in data collection, and helping to disseminate early warnings. They engage in continuous monitoring of local conditions and report potential risks to authorities, ensuring timely and effective responses to emerging threats.	External Consultants, other executing agencies, and national environment and social agencies.	Follow-up of the study and implementation of the activities of the ESMP about the bodies responsible for the management of water and environment and monitor the progress of the risks minimizing action.

## **CHAPTER 6: GRIEVANCE MECHANISM (GRM) FOR THE STAKEHOLDERS**

The GRM provides multiple channels for submitting grievances, such as in-person, hotlines, emails, and written correspondence, functioning at both local and central levels. Clear procedures for handling complaints include receiving, registering, investigating, and resolving them within defined timelines, while maintaining confidentiality, and protecting complainants from retaliation. Regular public reports on grievance resolutions ensure transparency and build trust.

GRM also focuses on vulnerable groups, offering multiple reporting channels like email, social media, postal mail, and a 24/7 hotline, along with complaint books at administrative offices. Feedback is gathered through short surveys after activities to continuously improve the process. The project team is committed to addressing grievances promptly and fairly, allowing anonymous submissions and encouraging open dialogue.

Grievances are carefully documented on a registration form and managed by the Project Management Unit (PMU) safeguards officer, ensuring timely redressal and communication with complainants. The grievance process involves four levels: field-level resolution within three days, escalation to the Project Execution Unit within seven days, further escalation to the Project Implementation Unit within 15 days, and final referral to the PMU for resolution within 30 days. Major unresolved issues may be taken to the country's legal system or the World Meteorological Organization (WMO) Accountability Mechanism.

Overall, the GRM aims to maintain positive relationships with beneficiaries, prevent issues from escalating, and support the project's success and sustainability by providing a structured approach to conflict resolution.

### **Step 1: Identify and Engage Key Actors in the Project/Community**

Conducting an effective stakeholder assessment is crucial to identify and engage trusted community leaders, ensuring representation from various groups such as women and indigenous people. These leaders play a vital role in developing, communicating, and educating others about the grievance mechanism. This step ensures diverse perspectives are included in the design process, gains commitment from key decision-makers for a swift response to complaints, builds trust between the project and the community, and fosters constructive engagement between grievance mechanism staff and the community.

### **Step 2: Understand the Current Environment**

After identifying and engaging key stakeholders, project staff and community partners should assess potential grievances and existing local methods for handling them. This involves frequent community visits to understand their concerns about the project and traditional conflict resolution methods. Project staff can share ideas for the grievance mechanism and gather valuable feedback from the community. This step helps design a suitable grievance mechanism by identifying available tools and the types of complaints it will likely address.

### **Step 3: Define the Scope of Grievances**

To understand the current environment, regularly visit the community and talk with project staff involved in daily operations to learn about their interactions with community members. This forms the basis for defining the purpose and goals of the grievance mechanism. Knowing the scope of grievances helps determine the mechanism's capacity and resource requirements.

### **Step 4: Determine the Purpose and Goals of the Grievance Mechanism**

As the final step in the initial implementation process, project staff should collaborate with community members to address the purpose and goals of the grievance mechanism, both short-term and long-term. They need to decide whether issues like criminal activity complaints, labor grievances, commercial disputes, or government policy concerns fall within the mechanism's scope. This step is crucial for establishing a mutual understanding of what the grievance mechanism will and will not address. Community and company meetings are essential for achieving consensus. Without this consensus, the grievance mechanism may lack legitimacy and fail to provide the necessary feedback to address community concerns and manage risks.

### **Step 5: Issue Resolution**

First Level Grievance:

Aggrieved persons at the local level or community who have a grievance or complaint start the process by contacting the local project staff, organization, or authorities. After receiving the complaint, the field-level responsible person will take three days to address the issue and identify measures for prevention or

management. If the grievance is resolved, a report will be developed and shared with the executing entities for risk tracking. If the grievance is not addressed at this level, it progresses to the next level.

#### Second Level Grievance:

All grievances that cannot be addressed within three days at the field level will be jointly reviewed by the Grievance Redress Committee (GRC) at the Project Execution Unit level. The In-charge will attempt to resolve them within seven days. The In-charge of the Project Execution Unit will be responsible for monitoring the process. The person of the Project Execution Unit will be from the Bangladesh Meteorological Department (BMD)/DHM.

#### Third Level Grievance:

The In-charge of the Project Execution Unit will refer any unresolved or major issues to the responsible person from the Project Implementation Unit (PIU) to resolve them within 15 days. The World Meteorological Organization (WMO) will be responsible for project implementation.

#### Fourth Level Grievance:

Major issues that are beyond the jurisdictional authority of the GRC, those that have the potential to cause social conflicts or environmental damage, or those that remain unresolved at the PIU level will be referred to the Project Management Unit (PMU) to be resolved within 30 days.

### **Step 6: Issue Closure Report**

An issue-closure report will be submitted to the WMO and the Adaptation Fund. All paperwork (details of grievances) needs to be completed by the PIU safeguards assistant and circulated to the respective In-charge of the Project Execution Unit and Project Implementation Unit at least one week before the scheduled meetings. All decisions made at different levels will be communicated to the Project Management Unit. Despite the project management, an aggrieved person shall have access to the country's legal system at any stage, and accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM. If the established GRM is unable to resolve the issue, the project-affected person (PAP) can also use the WMO Accountability Mechanism (AM) by directly contacting (in writing) the Complaint Receiving Officer (CRO) at WMO headquarters or the WMO Bangladesh Resident Mission (BRM) or DHM Nepal.

### **Step 7: Record Tracking**

All records of grievances and their resolutions will be meticulously tracked and documented to ensure transparency and accountability. This will contribute to the continuous improvement of the grievance mechanism and in building trust with the community.

The comprehensive grievance mechanism ensures that the HydroSOS-BaNe project can effectively address and resolve complaints, fostering a collaborative and transparent relationship with communities and other stakeholders.

### **Grievance Redress Committee**

Grievance Redress will be formed at local and national level to take the steps to resolve any issues that may arise. The members of the committee will be from Bangladesh Meteorological Department, Bangladesh Water Development Board, Department of Disaster Management and representative from Local Government Administration (Union Parishad). In case of Nepal, the members of the committee will be from DHM, MOHA, NDRRMA and representative from local government

### **Grievance Redress Process**

At the Implementing Agency level, the grievance mechanism will be regularly monitored for complaints from the beneficiaries or stakeholders who will share their feedback directly through the post mail, phone, fax or email using the below details.

#### **Bangladesh Meteorological Department**

E-24, Agargaon, Dhaka-1207, Bangladesh Phone: +88 02 41025730, 41025731, 41025705  
Fax: +88 02 41025726, 41025727, 41025728; Email: info@bmd.gov.bd ; swc@bmd.gov.bd

#### **Bangladesh Water Development Board**

16 Merul Badda, Dhaka 1215, Bangladesh; Email(s): shamal1967@yahoo.com, se.pffc@bwdb.gov.bd  
Contact person: Dr. Shamal Chandra Das; Phone: +8801759693375

#### **Department of Hydrology and Meteorology in Nepal**

Government of Nepal, Ministry of Energy, Water Resources and Irrigation, Babarmahal, Kathmandu, Nepal  
 +977- 1- 5319052, 5358224, 5358276, 5319007, dg@dhm.gov.np

**National Disaster Risk Reduction and Management Authority**

Singhadurbar, Kathmandu, Nepal, P.O. Box no. 213213, Telephone: 01-4211194 / 4211197 / 4211195, Email: info@bipad.gov.np, ndrma@gmail.com, [admin@ndrrma.gov.np](mailto:admin@ndrrma.gov.np), Web Link: [www.bipad.gov.np](http://www.bipad.gov.np)

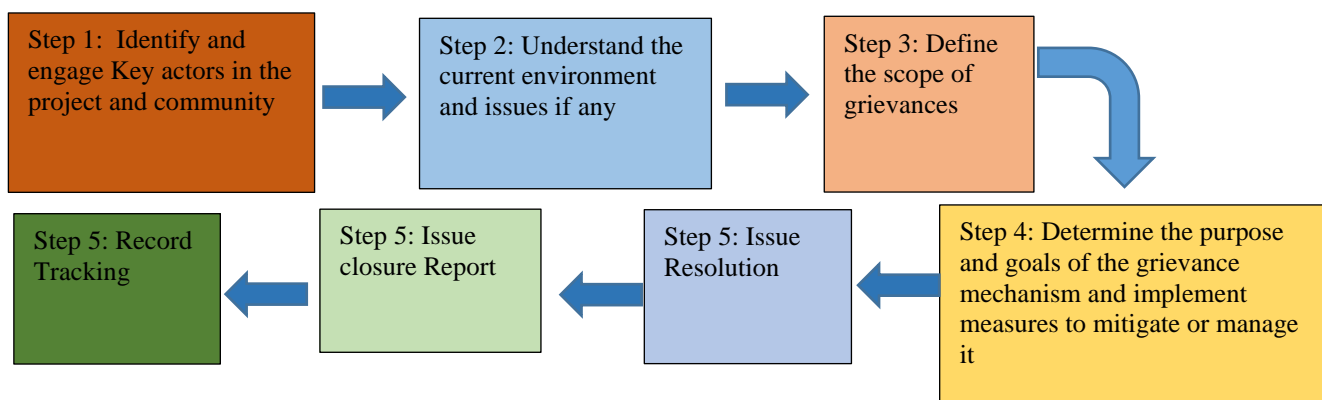
**World Meteorological Organization**

Associated Programme on Flood Management/Integrated Drought Management Programme 7bis, avenue de la Paix Case Postale No. 2300; CH-1211 Geneva 2, Switzerland Tel.: + 41 (0) 22730 81 11 and email: floodmanagement@wmo.int

**Adaptation Fund**

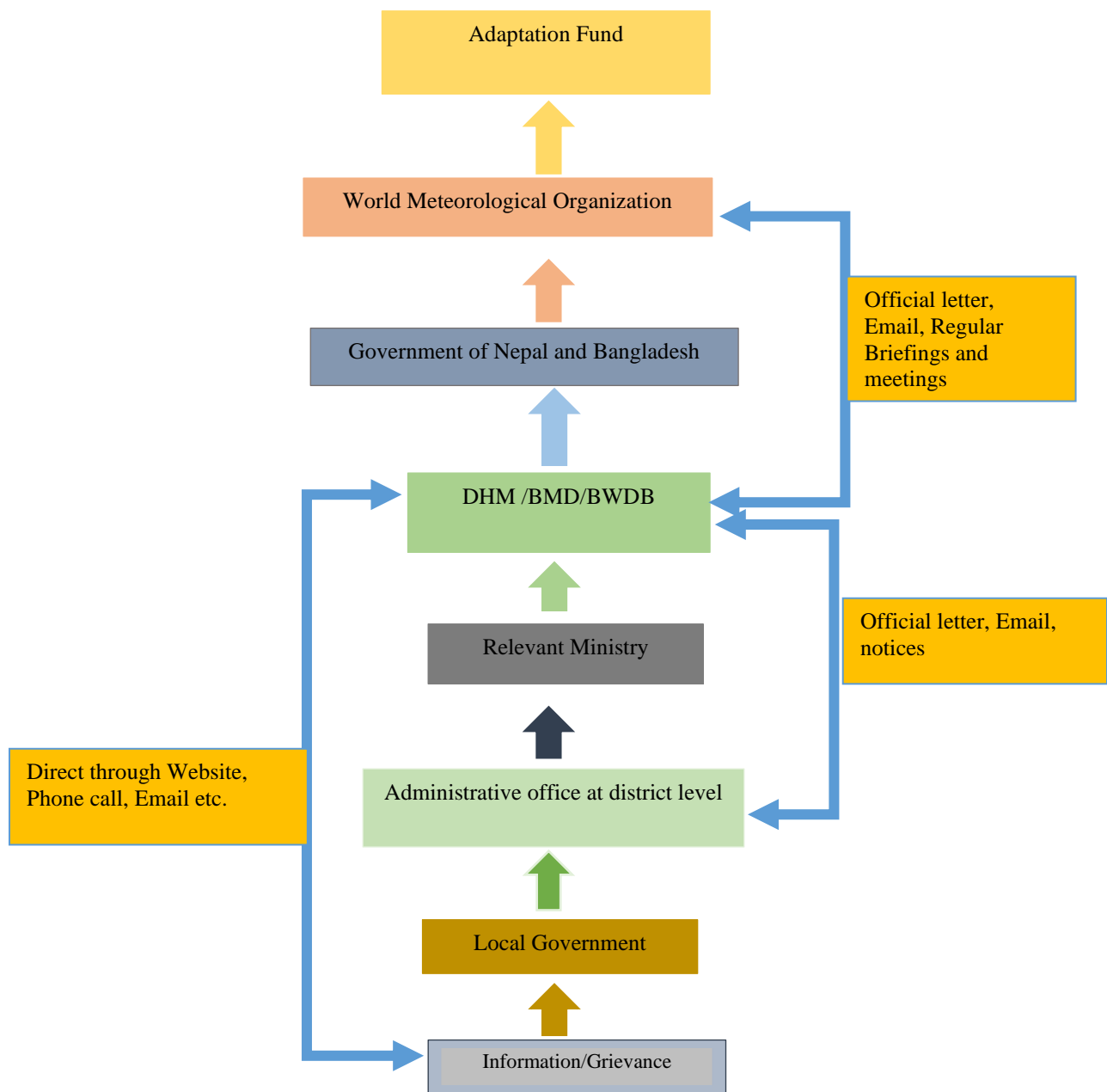
Issues or Grievances can be directly reported to the Adaptation Fund using the below form or contact address <https://www.adaptation-fund.org/contact/>  
 Adaptation Fund Postal Address  
 Adaptation Fund Board Secretariat; Mail stop: N 7-700; 1818 H Street NW; Washington DC 20433; USA; +1.202.473.0701 (v); +1.202.522.3240 (f)

**Diagram 1: Identification of risks or issues on social and environmental principles of the Adaptation Fund**



<https://www.cao-grm.org/purpose-design-and-implementation>

**Diagram 2: Grievance Mechanism Chart and procedure for risk mitigation and management**



**Photographs-Public Consultation-Key Informant Interview at National Level and local level during EIA and SIA study**

**Bangladesh**

	
<p>Superintending Engineer and Hydrological Adviser, FFWC, BWDB</p>	<p>Executive Engineer, FFWC, BWDB</p>
	
<p>Senior National Agromet Technical Coordinator, DAE</p>	<p>Principal Scientific Officer, WARPO</p>
	
<p>Deputy Secretary (Relief) and Deputy Director (Research), Department of DM Management, Ministry of Disaster Management and Relief</p>	

**Photographs-Public Consultation-Key Informant Interview at Local Level**

	
<p>Upazila Agriculture Officer, DAE, Nageswari, Kurigram</p>	<p>UP member, Nageswari, Kurigram</p>

**Photographs-Public Consultation-Focus Group Discussion at Local Level**

	
<p>Burungamari, Kurigram</p>	<p>Nageswari, Kurigram</p>
	
<p>Godagari, Rajshahi</p>	<p>Tanore, Rajshahi</p>

**Photographs of Nepal**



NDRRMA, Central Level



Ministry of Energy, Water Resources and Irrigation



Department of Water Resources and Irrigation, Central Level



NDRRMA, Central Level



Community Consultation



Site Visit to during community consultation



Community Consultation



Discussion with the Disaster Focal person



Discussion with the Disaster Focal person



Discussion with Mayor



Discussion with Deputy Mayor



Discussion with Mayor



Discussion with local community



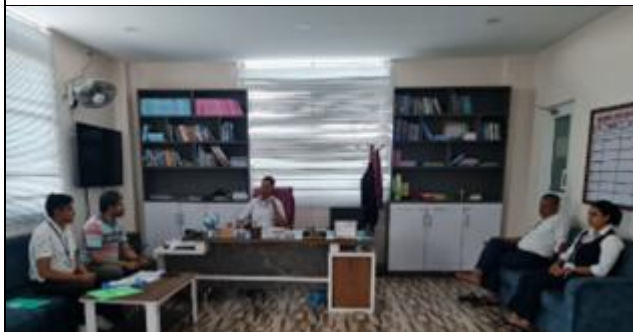
Discussion with local community



Discussion with local community



Discussion with local community



Local level meeting



Discussion with local community

### CHAPTER 7: Conclusion for ESMP

The Environmental and Social Impact Assessment (ESIA) systematically evaluated potential impacts, focusing on flood and drought forecasting and early warning systems. Through comprehensive assessments and stakeholder consultations, the ESIA identified key environmental and social concerns. The project is expected to have both positive and negative impacts. On the positive side, it will enhance flood and drought forecasting, early warning systems, economic development, and livelihoods. The ESIA findings should guide decision-makers to implement the project responsibly, maximizing benefits while minimizing negative impacts on the environment and communities. An Environmental and Social Risk Management Plan (ESMP) supports this report, outlining procedures to address risks during project implementation.

**Overall Conclusion of the EIA and SIA study carried out for the HydroSOS-BaNe project**

The environmental and social assessment report of the project is the result of consultations and data collection at various levels of the GBM river basin. These consultations supported the synthesis of reports and other reference documents reviewed by the consultant before, during, and after his mission.

The purpose of the ESIA report is to identify the potential impacts that may be caused by the implementation of the project on integrated management of floods and droughts in the GBM river basin area. It should be noted that this project, carried out by the WMO and its collaborators, is supported by all stakeholders consulted due to the relevance of the actions envisaged and the context of recent extreme climate events that pose major constraints to any production actions for the benefit of citizens. Few concerns were raised, and recommendations have been made by the consulted stakeholders, which served to identify expected impacts and propose measures for proper management during the project implementation. An environmental and social risk management plan is developed in support of this report, summarizing the procedures to resolve any risks encountered during the project implementation.

[WMO Annex - Google Drive](#) (Annex are provided in the below Google drive)

[Annex I- Questionnaire Bangladesh.docx](#)

[Annex I- Questionnaire Nepal.docx](#)

[Annex II- Participant List Nepal.docx](#)

[Annex II- Participants List Bangladesh.docx](#)

[Annex III-Photograph Bangladesh and Nepal.docx](#)

## Annex 4: Gender Assessment and Gender Action Plan (GAAP) for HydroSOS-BaNe project

### Gender Assessment Report and Gender Action Plan for strengthening climate change adaptation measures (Early Warning Systems) in Bangladesh and Nepal through HydroSOS-BaNe project

**Gender Assessment Report** outline tailored to understand underlying causes, gaps and needs on the Climate Change adaptation measures such as Early Warning Systems (EWS) in **Bangladesh** and **Nepal**, with a focus on **gender equity, inclusion, and effectiveness**.

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#### Acronyms

BMD: Bangladesh Meteorological Department  
 BWDB: Bangladesh Water Development  
 CBOs: Community Based Organisations  
 EWS: Early Warning System  
 GAP: Gender Action Plan  
 GAAP: Gender Assessment and Action Plan  
 GoB: Government of the People's Republic of Bangladesh  
 GP: Gender Policy  
 ICIMOD: International Centre for Integrated Mountain Development  
 IOs: International Organizations  
 MoEFCC: Ministry of Environment, Forests and Climate Change  
 NAP: National Adaptation Plan  
 NAPA: National Adaptation Programme of Action  
 NGOs: Non-Governmental Organisations  
 UNDP: United Nations Development Programme  
 UNICEF: United Nations International Children's Emergency Fund  
 WB: World Bank  
 WMO: World Meteorological Organization

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Table-2 National Laws and Policies on Gender Equality

Table-3 Gender in National Environment and Climate Change-Related Laws and Policies in Bangladesh

Table-4 Gender in National Environment and Climate Change-Related Laws and Policies in Nepal

Table 5: Comparative Insights on gender specific related issues or challenges

Table 6: List of stakeholders consulted

### Context and Purpose

Under the framework of the Hydrological Status and Outlook System for Bangladesh and Nepal (HydroSOS-BaNe) project, which is presently under development and submitted to the Adaptation Fund for endorsement and findings, it is mandated to have a gender assessment study carried out for the proposed project in the targeted countries in line with the Operational and Policy Guidelines of the Adaptation Fund's Gender Policy. During the Environmental and Social Impact Assessment (ESIA) supported in conducted a study on the gender related issues, needs and recommendations for mainstreaming gender into climate change adaptation measures linked to flood and drought management under the proposed HydroSOS-BaNe project. This report highlights some of the key gender related issues, gaps and needs that the HydroSOS-BaNe should consider through the Gender Action Plan presented for the proposed project related activities.

### Countries Introduction and Background

#### Country Background: Bangladesh

Bangladesh is the eighth most populous country in the world, with a population of approximately 169.8 million spread across an area of 148,460 square kilometers, according to the 2022 census. The country is located between the Himalayas and the Bay of Bengal, featuring gently sloping terrain that meets the Bay of Bengal at the southern end. Bangladesh is highly vulnerable to natural disasters, particularly floods and droughts, which cause significant socio-economic and environmental challenges.

The country's geographical location contributes to its susceptibility to extreme events, leading to infrastructure damage, reduced agricultural productivity, and increased human insecurity. The north-western region of Bangladesh frequently experiences floods that shape the environment and pose severe challenges.

The Dry Season (Nov-Mar) is hot and sunny, highs around 30°C (86°F), sometimes rainy in November and the Winter (Dec-Jan) is Warm days, cool nights, fog inland. Highs below 20°C (68°F), with night lows 3-6°C (37-43°F) in the north, 10°C (50°F) in the south. Spring (Mar-May) is the hottest season, max temperatures 35°C (95°F) inland, 32-33°C (90-91°F) coast. Peaks up to 42-43°C (108-109°F) in the north. High humidity, thunderstorms, rainfall up to 250mm (10 in) in May. The Monsoon season (Jun-Oct) starts late May/early June, heavy rains, high humidity, daytime highs 30-32°C (86-90°F). Rainfall peaks 800mm (31.5 in) in Sylhet, 1000mm (40 in) in Teknaf. Less intense in the west,



Figure 8: Physiographical map of Bangladesh

where annual rainfall ranges between 1500-1600mm (60-63 in)<sup>93</sup>.

The north-western region of Bangladesh frequently experiences floods that shape the environment and pose severe challenges. These floods lead to soil erosion, habitat loss, and disruptions in ecosystems, affecting wildlife and fisheries. Contaminated water sources promote waterborne diseases and displace communities. Managing floods requires balancing their benefits for sustainable development with efforts to mitigate adverse impacts.

The western Barind Tract region in the mid-western of Bangladesh faces semi-arid conditions with low rainfall, resulting in droughts. Extended dry spells during the pre-monsoon and post-monsoon seasons lead to water scarcity, soil degradation, reduced agricultural productivity, and biodiversity loss. Inadequate water management infrastructure exacerbates these impacts, leading to water stress and socio-economic disparities.

### Country Background: Nepal

Nepal, a landlocked mountainous nation, is strategically situated between India to the south, east, and west, and China to the north. The country is divided into five distinct physiographic regions running east to west: Terai, Siwalik (Churia), Middle Mountains, High Mountains, and High Himal<sup>94</sup>. This geographical diversity ranges from lowlands in the south, less than 60 meters above sea level, to the towering peaks of the Himalayas, including Mount Everest at 8,848 meters, along with eight other mountains exceeding 8,000 meters and more than 200 peaks above 6,400 meters, all within a span of just 200 Km<sup>95</sup>. The geographical map of Nepal is showed in below.

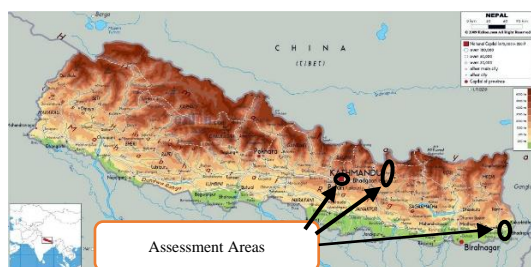


Figure 9: Physiographical map of Nepal

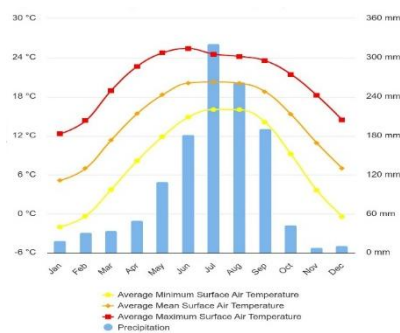


Figure 10: Average monthly climatology for mean surface temperature and precipitation from 1991 to 2022

Source: Climate Change Knowledge Portal, World Bank<sup>1</sup>

In Nepal, the average annual maximum temperature is increasing by 0.056°C/year and the minimum by 0.002°C/year. The minimum temperature is decreasing in mountainous districts like Humla and Manang but rising in the central Terai and Middle Mountainous regions. On the other side the average annual precipitation has declined by 1.3 mm per year over the period of 1971-2014<sup>96</sup>. Rapid changes in temperature and precipitation are significantly impacting forests, biodiversity, water resources, food production, and livelihoods.

These extreme variations pose substantial risks to growth and distribution in these areas<sup>97</sup>.

Water and forests are Nepal's most abundant natural resources, with freshwater (derived from glaciers, snow, and rainfall) accounting for an estimated 2.27% of the total world supply<sup>98</sup>. This water feeds the country's major rivers: Koshi, Gandaki, and Karnali. Together, these river systems supply freshwater to a large portion of the 500 million people who live in the Ganges River basin<sup>99</sup>. Small-scale, subsistence agriculture is a mainstay of Nepal's economy, employing 69% of the country's workforce in 2015. Despite this, agriculture contributed only 25% to GDP in 2019, compared to a 60% contribution from the service sector. Furthermore, Nepal's vulnerability to climate change impacts and recent studies shows that Nepal will face loss 2.2% of annual GDP due to climate change by 2050<sup>100</sup>.

In the future, the rise in maximum and minimum temperatures is expected to be more pronounced than the average temperature increase, intensifying pressure on human health, livelihoods, and ecosystems. Temperature increases will be strongest during winter, glaciers are melting rapidly, and extreme precipitation events are becoming more frequent. These changes heighten the vulnerability of Nepal's communities, especially those in poverty and reliant on subsistence agriculture. As climate change impacts become more severe, Nepal must pursue sustainable,

<sup>93</sup> (Source: World Climate guide, <https://www.climatestotravel.com/climate/bangladesh>)

<sup>94</sup> Nepal's Third National Communication to The United Nations Framework Convention on Climate Change, Government of Nepal, Ministry of Forests and Environment, 2021

<sup>95</sup> Nepal Geography, <https://www.countryreports.org/country/Nepal/geography.htm>, May 4, 2024

<sup>96</sup> Vulnerability and Risk Assessment and Identifying Adaptation Options: Summary for Policy Makers, MoFE, GoN, 2021

<sup>97</sup> Vulnerability and Risk Assessment and Identifying Adaptation Options Sectoral Report Forests, Biodiversity, and Watershed Management, MoFE, GoN, 2021

<sup>98</sup> Country Environment Note Nepal, Asian Development Bank, 2014

<sup>99</sup> Climate Risk Country Profile: Nepal (2021): The World Bank Group and the Asian Development Bank.

<sup>100</sup> Climate Change Knowledge Portal, World Bank Group, <https://climateknowledgeportal.worldbank.org/country/nepal>, May 4 2024

inclusive, and resilient growth. The country's achievements in community forestry and hydropower provide a strong foundation for future climate-smart development<sup>101</sup>.

Nepal faces significant vulnerability to climate change, experiencing an increasing incidence of landslides, flash floods, extreme heat, and droughts. Ranked as the tenth most affected country globally by the Long-Term Climate Risk Index<sup>102</sup>, about 80% of Nepal's population is exposed to climate-induced hazards such as floods, landslides, heat stress, and drought<sup>103</sup>. The country's high susceptibility to the adverse effects of climate change stems from its diverse topography, fragile geological structures, sensitive ecosystems, and varied climate and microclimate zones. Additionally, poverty, social disparities, and heavy reliance on natural resources for livelihoods exacerbate Nepal's sensitivity to climate impacts<sup>104</sup>. Floods and landslides are the most common hazards, with their frequency having doubled in recent years<sup>105</sup>.

### Methodology

The methodology ensures the validity and reliability of the Gender Assessment by providing a systematic approach for data collection, analysis, and interpretation, promoting transparency and trust through meetings, literature reviews, public consultations and surveys at local and national levels. This participatory and inclusive approach aligns with the guidelines and the detailed scope of work, ensuring the active involvement of all stakeholders, particularly vulnerable communities such as women and the elderly, local government officials, and central-level agencies/ministries.

### Inception Meeting

In Bangladesh, the inception meeting was held with the Bangladesh Meteorological Department (BMD) and Bangladesh Water Development (BWDB) to discuss objectives, national agencies to be involved in the consultations to carry out community consultations, timelines, resources, and data collection methods for the assessment. In the case of Nepal Inception meeting was held with Department of Hydrology and Meteorology (DHM) to discuss objectives, identify national agencies focal points for consultation meetings, geographic areas (Kankai, Bangladesh, Tinau River (Palpa, Rupandehi), Tamakoshi River (Dolakha), timelines, etc.

### Desk review

The consultant reviewed the project concept note documents and literature related to the HydroSOS-BaNe project including the present characteristics and baseline situations, interdisciplinary practices and approaches associated with the use of natural resources (ecosystems and other environmental resources) and social and cultural welfare (livelihood and social system) in the GBM region, and other on-going projects or initiatives in the targeted countries related to climate change adaptation and disaster risk management. The consultant had also reviewed the 15 principles of ESP and Gender policy of Adaptation Fund and examined its compliance.

### Tools used for gender analysis

Following the initial meetings, an online survey was developed and shared with various stakeholders of the two countries including government officials, International Organizations (IOs), Non-Governmental Organizations (NGOs), community representatives etc. 25 responses were received from various stakeholders sharing gender specific issues and challenges, suggestions for improvements etc.

### Institutional Set up in Bangladesh and Nepal for climate change adaptation and disaster risk management related mandates and responsibilities in strengthening social, economical and environmental developments.

Table 1: List of agencies involved in climate change adaptation and disaster risk management related mandates and responsibilities in Bangladesh and Nepal

Bangladesh	Nepal
Names of the agencies or department	Names of the agencies or department
Flood Forecasting and Warning Centre (FFWC)	Ministry of Women, Children and Senior Citizens

<sup>101</sup> Country Climate and Development Report Nepal. The World Bank Group, 2022.

<sup>102</sup> Eckstein, D., Künzel, V., Schäfer, L., 2021. GLOBAL CLIMATE RISK INDEX 2021: Who Suffers Most from Extreme Weather Events? Weather-Related Loss Events in 2019 and 2000–2019. Germanwatch, Berlin. Retrieved from: [https://www.germanwatch.org/sites/default/files/Global%20Climate%20Risk%20Index%202021\\_2.pdf](https://www.germanwatch.org/sites/default/files/Global%20Climate%20Risk%20Index%202021_2.pdf).

<sup>103</sup> MoHA, 2018. Nepal Disaster Report 2017: The Road to Sendai. Ministry of Home Affairs, GoN, Kathmandu.

<sup>104</sup> Government of Nepal, 2019. National Climate Change Policy, 2076 (2019)

<sup>105</sup> Country Climate and Development Report Nepal. The World Bank Group, 2022.

Bangladesh Water Development Board (BWDB), Ministry of Water Resources	Ministry of Forest and Environment
Water Resources Planning Organization (WARPO)	Ministry of Energy, Water Resources and Irrigation
Department of Agriculture Extension (DAE), Ministry of Agriculture (MoA)	Department of Hydrology and Meteorology
Bangladesh Meteorological Department (BMD)	High Powered Committee for Integrated Development of the Bagmati Civilization
Ministry of Disaster Management & Relief	National Disaster Risk Reduction and Management Authority
Local authorities	Water and Energy Commission Secretariat
Community Based Organizations (CBOs)	Department of Water Resource and Irrigation
	Local Governments and CBOs

**Table-2 National Laws and Policies on Gender Equality**

**Bangladesh**

<b>Year</b>	<b>Laws and Policies</b>
1972	Representation of the People Order
1985	Family Courts Ordinance
2000	Nari-O-Shishu Nirjaton Domon Ain, or Violence against Women and Children Restraining Act
2004	National Parliament (Reserved Women Seat) Election Act
2006	Bangladesh Labour Act
2009	Local Government (Pouroshova) Act, Local Government (Union Parishad) Act, and Local Government (City Corporation) Act
2010	Domestic Violence (Prevention and Protection) Act
2011	National Women Development Policy
2012	National Labour Policy
2013	Domestic Violence Prevention and Protection Rules

**Table-3 Gender in National Environment and Climate Change-Related Laws and Policies in Bangladesh**

<b>Name</b>	<b>Key national laws and policies</b>
National Adaptation Programme of Action (NAPA), 2009	Proposes targeted strategies for adaptation, including 15 projects aimed at enhancing immediate and critical adaptation efforts to combat present and expected negative impacts of climate change, including extreme events.
National Adaptation Programme of Action (NAPA), 2009	Developed to guarantee the incorporation of gender equality in climate change-related policies, strategies, and actions.
National Biodiversity Strategy and Action Plan (2016-2021)	<ul style="list-style-type: none"> <li>Advises acknowledging and integrating women's current contributions to biodiversity preservation, ensuring equal opportunities for them.</li> <li>Seeks to enhance the capabilities of rural women, empowering them to participate in biodiversity conservation at home and within their communities.</li> </ul>
National Plan for Disaster Management (2016-2020)	This plan includes guidelines for incorporating gender considerations in all plans and actions. However, the integration of gender in DRR is general, with a notable absence of detailed gender-specific references and strategies.
Bangladesh Delta Plan 2100	The document makes only slight reference to gender, labeling women as "vulnerable" without recognizing their potential role as catalysts in achieving climate and disaster resilience. It also lacks distinct strategies or plans focused on promoting gender equality.
Perspective Plan of Bangladesh, 2021-2041	<ul style="list-style-type: none"> <li>The Perspective Plan of Bangladesh treats both gender and environmental issues as crucial aspects of development, dedicating separate chapters in the document to address each.</li> </ul>
Mujib Climate Prosperity Plan (MCP) – Decade 2030	<ul style="list-style-type: none"> <li>Aims to support climate financing for at-risk communities and promote women's empowerment.</li> </ul>

**Table-4 Gender in National Environment and Climate Change-Related Laws and Policies in Nepal**

Constitution of Nepal (2015)	<p>Article 18: Guarantees equality before the law and prohibits discrimination based on gender.</p> <p>Article 38: Ensures women’s rights including reproductive health, equal property rights, and participation in all state structures.</p> <p>Article 50 (2): Directs the state to pursue policies for inclusive participation, including women in governance and development.</p>
Gender Equality Act (2006)	<ul style="list-style-type: none"> <li>• Amended discriminatory provisions in existing laws (such as property, citizenship, and violence laws).</li> <li>• Strengthened the legal basis for equal inheritance and property rights for women.</li> <li>• Key in removing the legal requirement of male guardianship in many areas of law.</li> </ul>
National Policy on Gender Equality and Empowerment of Women (2023)	<ul style="list-style-type: none"> <li>• Focuses on: <ul style="list-style-type: none"> <li>○ Women's economic empowerment</li> <li>○ Equal access to services and justice</li> <li>○ Leadership and political participation</li> <li>○ Promotes integration of gender into climate change, DRR, and resilience-building strategies.</li> </ul> </li> </ul>
Disaster Risk Reduction and Management Act, 2017	<ul style="list-style-type: none"> <li>• Mandates inclusion of women and marginalized groups in all levels of disaster management committees.</li> <li>• Aligns with the Sendai Framework, which emphasizes gender equity in DRR.</li> </ul>
Local Government Operation Act, 2017	<ul style="list-style-type: none"> <li>• Empowers local governments to form gender and social inclusion committees.</li> <li>• Ensures at least 40% women representation in ward committees.</li> <li>• Provides authority to local bodies to plan and implement gender-sensitive disaster response.</li> </ul>
National Plan of Action on Gender-Based Violence (2010–2015, new version under discussion)	<ul style="list-style-type: none"> <li>• Focus on prevention, protection, and justice.</li> <li>• Stresses multisectoral collaboration — relevant for DRR planning where GBV risk increases.</li> </ul>

### Issues, challenges and gaps related Gender and Social Inclusion in the two Countries

Based on the available research through Survey and study reports especially the Country Gender Assessment reports from the World Bank for Bangladesh<sup>106</sup> and Nepal<sup>107</sup>, following are the key observations on climate change impacts and growing gender related issues

#### Bangladesh

Climate change is exacerbating gender inequality in Bangladesh, in large part due to women’s dependence on agriculture. It has been found that the climate change disproportionately impacts women, and a faster growth can no longer be pursued at the cost of environmental degradation; future growth needs to be inclusive and resilient to climate change. A holistic understanding of the ways in which climate change affects women and girls have been considered in developing solutions and envisioning green growth. Opportunities should be shaped to benefit

<sup>106</sup> Bangladesh Country Gender Assessment report 2021, World Bank <https://openknowledge.worldbank.org/server/api/core/bitstreams/25f68522-859f-59df-b98f-8295e07dd215/content>

<sup>107</sup> Nepal Country Gender Assessment report 2025, World Bank <https://documents1.worldbank.org/curated/en/099052725132524773/pdf/P179463-e4d21e32-7647-4a2f-b015-1a2f3746e281.pdf>

women and girls and to create innovative avenues that help them overcome existing work-related constraints. In addition to being disproportionately impacted by climate disasters, women and girls face gender-specific barriers in adapting to climate change. Existing inequalities in living standards and control over household resources also impact women's resilience and ability to adapt to climate change. While men have the flexibility to adopt coping mechanisms by acquiring new skills or migrating to urban settings to access green jobs, women's access to such options may be challenged by limited decision-making power (Solotaroff et al. 2019a), social norms (ILO 2015), risks of gender-based violence (WHO 2021) and access to finance (Demirguc-Kunt et al. 2018).

## Nepal

In Nepal, climate change is exacerbating gender inequalities, particularly for women heavily involved in agriculture and natural resource management, sectors directly impacted by climate change. In 2023, more than a third (34 percent) of all households engaged in agriculture are headed by women. In addition, a study by ICIMOD (International Centre for Integrated Mountain Development) highlights that women face heightened vulnerability to climate-related shocks in rural areas, where agriculture is the primary source of income. Women's work in farming, water collection, and firewood gathering is being increasingly disrupted by erratic weather patterns, such as prolonged droughts, unseasonal rainfall, and floods. For example, the 2015 earthquake and subsequent landslides and floods displaced thousands of women, leaving them without shelter and essential resources. According to ICIMOD, women in these regions also suffer more from food insecurity, as they are responsible for feeding their families and are less likely to have access to adaptive farming techniques or financial resources to cope with crop failure. Nepal must adapt its development pathway to a changing climate; women are both disproportionately impacted and uniquely positioned to enhance the country's adaptation and resilience to landslides and other natural calamities unique to Nepal. Climate change-induced impacts such as increased flooding, landslides, reduced crop yields and livestock production as well as other natural calamities unique to Nepal, place pressure on labour productivity and health and are expected to be a continual drag on growth. Women are often excluded from mainstream development and suffer from cumulative and cascading impacts of climate change and disasters. On the other hand, their role in agriculture and in natural resource management makes women key players when it comes to critical measures, including enhancing water management, transitioning to sustainable forest management, and embracing climate-smart agriculture (WBG 2022).

## Key survey results from the 24 responses received from various stakeholders of the two countries and evaluating the gender dimensions of climate change adaptation measures, specifically focusing on Early Warning Systems (EWS) in Bangladesh and Nepal.



19. In your opinion, how could the project improve its gender responsiveness and inclusivity?

24 Responses

ID ↑	Name	Responses
1	anonymous	we need further information to answer
2	anonymous	Appoint a Gender Focal Point or Advisor to oversee integration throughout the project cycle and ensure gender-responsive feedback loops
3	anonymous	To improve gender responsiveness and inclusivity, the project could strengthen ongoing gender training for all staff, enhance the collection and use of sex-disaggregated data, actively involve women and marginalized groups in decision-making at all levels, and ensure that project activities and resources address the specific needs and barriers faced by diverse gender groups. Additionally, establishing safe feedback mechanisms for women and vulnerable populations would help the project adapt and respond better to their concerns.
4	anonymous	Through research, workshop, interviews etc
5	anonymous	Door to door awareness Ensure women's participation
6	anonymous	The project could improve its gender responsiveness and inclusivity by actively involving women and marginalized groups in planning and decision-making processes. It should ensure equal access to resources, information, and services tailored to diverse gender needs. Additionally, incorporating gender-sensitive training and monitoring can help address inequalities throughout the project cycle
7	anonymous	ensure woman's participations door to door awareness
8	anonymous	Gather men and women opinion, provide safety measures
9	anonymous	To enhance gender responsiveness and inclusivity, the project should implement a gender-responsive policy, conduct thorough gender analyses, engage diverse stakeholders, set gender-responsive goals and indicators, and ensure gender-responsive data collection.
10	anonymous	Add female in leading position yes
11	anonymous	Including men and women both in project work.
12	anonymous	1. Involve diverse genders in all stages of decision-making. 2. Use sex-disaggregated data to inform actions. and 3. Integrate gender-sensitive services and GBV safeguards in interventions.
13	anonymous	empower women through capacity building trainings so they can contribute to the household income, previous studies have showed that women who are financially contributing to the household income are more inclined towards playing an active role in disaster preparedness and response actions. Thus the project can strengthen community resilience to hydrometeorological hazards
14	anonymous	Ensure women's participation in planning, implementation, and monitoring at all levels. Use gender-disaggregated data to design targeted interventions. Provide inclusive training with flexible schedules and safe environments. Design safe WASH facilities addressing privacy and menstrual hygiene. Support women's livelihoods through access to finance, skills, and markets. Engage men and boys to promote shared responsibilities and reduce GBV. Track gender outcomes using
15	anonymous	By including a gender focal point.
16	anonymous	Through gender based consultations and adopting representatives from gender groups
17	anonymous	1. Inclusion of training programs targeting women professionals in NMHSs, BWDB, DHM, and local disaster management bodies. 2. Offering community-level training for women farmers, local women leaders, and young women on how to use risk maps and EWS.
18	anonymous	Ensuring equal participation in planning and decision-making, gender-sensitive risk assessments, inclusive communication and partnering with local women's groups to address specific needs.
19	anonymous	To enhance a project's gender responsiveness and inclusivity, it's crucial to integrate gender perspectives throughout the project lifecycle, from design to implementation and evaluation.
20	anonymous	Keep separate budget.
21	anonymous	This is comprehensive project for early warning. Capacity development program will be taken to include women in preparedness before floods and drought through access early warning.
22	anonymous	Area of Action Action Design Gender Analysis, inclusive consultation Communication Local language format Participation Remote Woman leaders Protection Safe Shelters Data Gender Focused Indicators Institutional More Capacity Building, more Alignment with Adaptation fund gender policy and action plan
23	anonymous	In Nepal, gender-related challenges during floods and droughts include unequal access to early warning information, limited participation of women in disaster planning, and increased caregiving burdens during crises. Women often face barriers in accessing relief, including a lack of gender-sensitive supplies and safe spaces in shelters. Social norms can restrict their mobility and decision-making power, while livelihood losses disproportionately affect women engaged in informal or subsistence farming. Addressing these issues requires gender-inclusive planning, equitable participation, and tailored support during preparedness and response actions.
24	anonymous	The project can enhance gender responsiveness by ensuring equal participation, leadership opportunities, and capacity-building for women, youth, and marginalized groups. It should also integrate gender-sensitive planning, monitoring, and outreach to address structural barriers and promote inclusivity.

The full survey result is available at the below link

[Gender Assessment Survey for the HydroSOS Bangladesh and Nepal \(BaNe\) project.pdf](#)

## 1. Country Assessment: Bangladesh

Based on the assessment study conducted through national and local consultation meetings as well as survey forms completed by various stakeholders in Bangladesh, the following are the initial findings on gender specific issues, challenges and possible recommendations to support gender mainstreaming at both national and local levels:

### 6.1. Gender related Issues and Gaps

- **Access:** Women's limited access to mobile phones, radio, or internet

Women, particularly in low-income, rural, and marginalized communities, often face restricted access to essential communication technologies such as mobile phones, radios, and the internet. This digital divide is influenced by a range of socio-economic and cultural factors, including lower income levels, limited digital literacy, social norms that prioritize men's ownership and use of technology, and safety or privacy concerns. In many households, communication devices are owned and controlled by male family members, restricting women's independent access to early warning information, emergency alerts, and disaster preparedness messages. The lack of access to these technologies reduces women's ability to receive timely, accurate information that is critical for making informed decisions during emergencies. This barrier not only increases their vulnerability to hazards but also limits their participation in community preparedness efforts and their inclusion in disaster risk reduction systems.

- **Participation:** Underrepresentation of women in local disaster committees groups

Women are significantly underrepresented in local disaster management committees and community-based preparedness groups, limiting their ability to contribute to planning, decision-making, and implementation of disaster risk reduction (DRR) and early warning activities. Despite often being frontline responders within their households and communities, women's voices are frequently excluded due to entrenched gender norms, lack of awareness about participation opportunities, and limited confidence or experience in public leadership roles. Institutional and structural barriers—such as male-dominated selection processes, limited outreach to women, and lack of gender-sensitive facilitation—also contribute to their marginalization in these spaces. This lack of representation results in disaster response plans and early warning systems that may overlook the specific needs, priorities, and capacities of women, girls, and other vulnerable groups. Promoting equitable participation of women in these committees is essential for ensuring inclusive, effective, and contextually appropriate disaster preparedness and response strategies.

- **Barriers:** Social norms limiting women's mobility and participation in the decision-making groups

Deeply rooted social and cultural norms in many communities impose significant constraints on women's mobility and their ability to actively participate in public decision-making processes, including disaster preparedness and early warning system (EWS) groups. These norms often dictate that women should remain within the domestic sphere, prioritizing household responsibilities over community engagement, which restricts their physical movement and limits their visibility in public forums. In some contexts, women require permission from male family members to attend meetings, travel to training sessions, or participate in community activities—reducing their opportunities for leadership, skills development, and influence over disaster-related planning. Additionally, prevailing gender stereotypes reinforce the perception that disaster planning and technical decision-making are male domains, further marginalizing women's voices and discouraging their involvement.

### 6.2. Opportunities for Improvement

There is a huge scope for improvements to overcome the gender related barriers faced by women and other vulnerable groups within the community on flood and drought management (climate change adaptation and disaster risk management in general)

- Community-based flood and drought preparedness and response measures with female volunteers

There is a significant opportunity to enhance the effectiveness and inclusivity of flood and drought preparedness and response efforts by engaging female volunteers through community-based approaches. Women, particularly those who are active at the grassroots level, possess critical local knowledge of water sources, agricultural cycles, caregiving practices, and community dynamics, which make them well-positioned to contribute meaningfully to early warning dissemination, evacuation planning, and the coordination of relief activities. Mobilizing and training female volunteers in flood and drought-prone communities can not only improve the

timeliness and reach of preparedness actions but also help ensure that the needs of women, children, the elderly, and other vulnerable groups are fully addressed. To maximize impact, this approach should be supported with appropriate resources, gender-sensitive training, safety measures, and recognition of women’s contributions—ensuring that their participation is meaningful, respected, and sustained

- Inclusive communication tools (e.g., pictorial warnings, megaphones)

To ensure that early warning messages and disaster preparedness information are accessible to all members of the community—regardless of gender, literacy level, language, age, or disability—there is a critical need to use inclusive communication tools. These tools include visual aids such as pictorial warnings and illustrated posters that can be easily understood by people with low literacy levels, as well as auditory tools like megaphones, loudspeakers, and community radio, which are effective in reaching people without access to digital devices

## 2. Country Assessment: Nepal

Based on the assessment study carried out through national and local consultation meetings and survey forms filled by various stakeholders in Nepal, following are the initial findings on gender specific issues, challenges and possible recommendations for improvement to support gender mainstreaming at national and local levels:

### 7.1. Gender related Issues and Gaps

- **Access:** Rural and indigenous women face digital and linguistic barriers

Rural and indigenous women often face significant challenges in accessing early warning information due to both digital and linguistic barriers. Many live in areas with limited or no internet connectivity, unreliable mobile networks, or without access to communication technologies such as mobile phones and radios—resources that are often controlled by male household members. In addition, digital literacy among women in these communities tends to be lower due to gendered disparities in education and technology training. Linguistic barriers further compound the problem, as early warning messages are frequently disseminated in dominant national languages rather than local or indigenous languages, making them difficult to understand or act upon. These combined factors limit the timely receipt, comprehension, and use of life-saving information by rural and indigenous women, increasing their vulnerability during disasters and emergencies.

- **Participation:** Limited training opportunities for women in EWS roles

Women, particularly in rural and marginalized communities, often face limited opportunities to participate in training programs related to Early Warning Systems (EWS), which restricts their involvement in hazard monitoring, information dissemination, and decision-making roles. These training gaps stem from multiple barriers, including social norms that prioritize male participation in technical fields, lack of outreach to women during capacity-building initiatives, and competing domestic responsibilities that hinder women’s ability to attend scheduled sessions. Furthermore, many training materials and methodologies are not gender-responsive and fail to consider the specific needs, learning styles, or time constraints of women. As a result, women’s potential to contribute meaningfully to the design, operation, and community outreach components of EWS remains underutilized, weakening the inclusiveness and effectiveness of these systems.

- **Control:** Men often control household-level decision-making on evacuation

In many communities, particularly in patriarchal or traditional settings, household-level decision-making regarding evacuation during disasters is predominantly controlled by men. This gendered power dynamic means that women—despite often being primary caregivers for children, the elderly, and persons with disabilities—may have limited influence over critical decisions such as when and how to evacuate, where to seek shelter, or what resources to take. This lack of control can delay evacuation, increase the risk to vulnerable family members, and reduce women’s ability to protect themselves during emergencies. Additionally, women may be unaware of or excluded from early warning messages and preparedness planning, further weakening their agency in high-risk situations. Addressing this issue requires not only empowering women with knowledge and resources but also challenging and transforming the unequal power structures that shape household decision-making in times of crisis.

### 7.2. Opportunities for Improvement

- Gender-inclusive training for community disaster volunteers
- Partnership with women’s groups for localized dissemination

**Table 5: Comparative Insights on gender specific related issues or challenges**

Category	Bangladesh	Nepal
Women in EWS roles	Moderate (e.g., CPP)	Low
Use of gender data in planning	Limited	Very limited
Language & literacy-sensitive tools	Emerging	Sporadic
Institutional gender policies	Present but weakly enforced	Often absent

**Recommendations based on secondary literatures/reports and assessment survey carried out for the HydroSOS-BaNe project**

**For Both Countries:**

- **Institutionalize sex- and age-disaggregated data collection**

Establish standardized systems and protocols within institutions to routinely collect, analyse, and report data disaggregated by sex and age across all levels and phases of disaster risk reduction and early warning systems. This includes integrating sex- and age-disaggregated indicators into data management frameworks, ensuring that all relevant agencies and stakeholders have the technical capacity and resources to gather such data, and using the information to inform gender-responsive planning, decision-making, resource allocation, and monitoring of impacts. Institutionalization also requires policy mandates, inter-agency coordination, and mechanisms for data sharing to ensure that such disaggregated data are consistently available, accessible, and used for equitable and inclusive risk communication, preparedness, response, and recovery interventions.

- **Develop gender-sensitive communication materials**

Design and produce communication materials that are inclusive, culturally appropriate, and tailored to address the specific needs, preferences, and challenges faced by individuals of all genders, particularly women, girls, and gender minorities. This includes using clear, simple language, local dialects, and diverse formats—such as pictorial messages, audio broadcasts, sign language, and digital platforms—to ensure accessibility for people with varying literacy levels and abilities. Gender-sensitive communication should consider differences in access to technology, roles and responsibilities within households, and information channels commonly used by different gender groups. Materials should promote gender equity, avoid stereotypes, and actively encourage the participation and empowerment of marginalized gender groups in disaster preparedness and early warning processes.

- **Support women-led early warning dissemination networks**

Promote and strengthen the active leadership and participation of women in the dissemination of early warning information by supporting the creation, capacity-building, and resourcing of women-led networks at national, regional, and community levels. This includes empowering women's groups, female community health volunteers, women in local disaster management committees, and grassroots organizations to serve as trusted messengers of early warning messages. Support should involve training in hazard monitoring, risk communication, and the use of information and communication technologies (ICTs), as well as providing financial and logistical resources to ensure their sustained involvement. By leveraging women's local knowledge, social networks, and trusted community roles, these networks can enhance the reach, relevance, and effectiveness of early warning systems—especially in reaching vulnerable populations such as children, persons with disabilities, the elderly, and other marginalized groups.

- **Integrate EWS into school curricula with a gender lens**

Incorporate Early Warning System (EWS) concepts, practices, and preparedness measures into formal and non-formal school curricula at all educational levels, ensuring that the content is developed and delivered through a gender-sensitive approach. This involves designing age-appropriate lessons that not only teach students how to understand and respond to early warning signals for various hazards but also highlight the different risks and barriers faced by girls, boys, and gender-diverse students in emergency situations. A gender lens ensures that learning materials challenge harmful gender norms, promote equal participation of girls and boys in emergency drills and preparedness activities, and recognize the unique roles young people of all genders can play in disseminating early warning messages within their families and communities. Teacher training, school safety planning, and extracurricular activities should also reflect gender-equitable principles to foster inclusive, resilient learning environments

**For Bangladesh:**

-Enable women farmers' access to and use of climate adaptive technologies.  
-Ensure that women can benefit from economic diversification spurred by climate adaption across a wide range of sectors and skill levels.

**For Nepal:**

-Increase women's knowledge, skills, and access to essential inputs (e.g., climate-resilient measures (including ICT))  
-Engaging women to strengthen resilience to disaster risks such as the actions outlined in the Action Plan on Climate Change (2020–

<p>-Engage women in disaster preparedness plans; ensure that early warning signals reach women</p>	<p>2030), which increases women’s access to resources and participation in decision-making processes.</p> <p>-Improve gender-risk assessment to ensure post-disaster needs are met in an inclusive manner by using tools such as the one mentioned in the Gender Equality, Disability and Social Inclusion (GEDSI) Strategy, namely, the establishment of a disaggregated data portal for identification of multi-hazard risks.</p> <p>-Elevating women leaders yields important inter-generational impacts by shaping more equitable attitudes and supportive social norms.</p> <p>-Improve institutional systems and capacity for monitoring and evaluating the gendered impacts of policies and programs.</p>
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#### Annexes

- **Table 6: List of stakeholders consulted**

Following are the list of stakeholders consulted in Bangladesh and Nepal during ESIA and Gender assessment and through the online survey forms.

<b>Bangladesh</b>	<b>Nepal</b>
<b>Names of the agencies or department</b>	<b>Names of the agencies or department</b>
Flood Forecasting and Warning Centre (FFWC)	Ministry of Women, Children and Senior Citizens
Bangladesh Water Development Board (BWDB), Ministry of Water Resources	Ministry of Forest and Environment
Water Resources Planning Organization (WARPO)	Ministry of Energy, Water Resources and Irrigation
Department of Agriculture Extension (DAE), Ministry of Agriculture (MoA)	Department of Hydrology and Meteorology
Bangladesh Meteorological Department (BMD)	High Powered Committee for Integrated Development of the Bagmati Civilization
Ministry of Disaster Management & Relief	National Disaster Risk Reduction and Management Authority
Local authorities	Water and Energy Commission Secretariat
Community Based Organizations (CBOs)	Department of Water Resource and Irrigation
	Local Governments and CBOs

- Interview guides and tools

The Gender assessment online survey forms and user questionnaire for the interviews are available here:

#### Gender assessment online survey forms



Or

<https://forms.office.com/e/DCThWmprqn>

#### User Questionnaire for the Hydrological Status and Outlook System (HydroSOS)-BaNe project

The questions below are designed to collect information on community’s experience and recommendations on Floods and Drought management and also any possible social and environmental risks associated with the project activities. Under the planned project, the project partners are planning to develop an information tool, called HydroSOS Early Warning System, to warn and prepare the citizens for floods and drought events.

Location: \_\_\_\_\_

Please click here to indicate that you agree to allow the use of your information for a regional assessment:

Questions:

1. Have you experienced flood and drought situations in the past?

Yes  No

If Yes, did you face negative consequences and lose properties or goods?

\_\_\_\_\_

2. Did you receive any warning about the flood or drought event?

Yes  No

If Yes,

By whom:

Village/Community Representative  Municipality  Disaster Management  others

\_\_\_\_\_

How?:

Word of mouth  Loudspeaker  SMS/Phone call  Television/Radio  others

\_\_\_\_\_

When before the event?

0-2 Hours  2-12 Hours  12-24 Hours  other duration: \_\_\_\_\_

3. Would you like to receive direct, quick and reliable warning information?

Yes  No

If Yes,

How would you like to receive this information?

4. Do you have access to smart phone and internet?

Yes  No

If Yes, then proceed to question 5 and 6.

5. If national agencies would provide a warning bulletin, what kind of information you would like to receive with it?

Water level

Water resources information

Precipitation

Forecasting for next days

Risk and safer zones/areas

Potential impact areas

Do you think based on the project activities, there will be any social and environmental risks associated during the implementation?

Any possible impacts or risks on marginalized, vulnerable populations? Any consideration for the project partners

What are potentials gender related, social and environmental related risks you see with the implementation of project activities and development of the outputs such as risk maps, EWS, community-based activities etc.?

Do you have additional comments and recommendations?

Thank you for filling out the form.

<b>Gender Action Plan (GAP) for the HydroSOS-BaNe project</b>					
<b>Output Description</b>	<b>Activities planned each output</b>	<b>Performance targets/Indicators by % of targeted women and youths (Baseline)</b>	<b>Responsible Entity</b>	<b>Target Timeframe</b>	<b>Proposed Budget (USD) for GAP</b>  N/A -Not applicable
<b>Component 1: Risk-based preparedness and adaptation to the climate variabilities and water and environmental uncertainties</b>					
<b>Outcome 1.1 Floods and drought risks informed decision-making at the regional, national and local levels</b>					
Output 1.1.1 Vulnerability and exposure assessment (including gender and sector-wise analyses) and risk maps are developed for the GBM basin	Activity 1.1.1.1 Conduct a desk study (compilation of existing evidence-based past data (topographic maps, satellite images, studies of extreme events, reports of disasters, etc.) available at the national and regional levels) and field visits to 10 selected pilot locations to gather available information on vulnerability and exposure for current and future climate and identify gaps or additional needs.	More than 50% of the consulted stakeholders are women, youths and other vulnerable groups (Baseline:10%)	PMU Technical officers	Q3-Q4 2026	3,000
	Activity 1.1.1.2 Develop an action plan (one regional and two national levels) to complement gathered information on the exposure and vulnerabilities	Action plans are developed in joint consultation of all stakeholders including women, youths, elderly etc. (Baseline:0)	PMU Technical officers and selected technical partners (NGOs)	Q1-Q2 2027	N/A as it is related to technical reports/ desk study
	Activity 1.1.1.3 Organize stakeholder's consultation (two national meetings and one regional workshops), working on risk management to select priority areas for community consultations.	More than 50% of the workshop participants are women, youths and other vulnerable groups (Baseline:10%)	PMU Technical officers	Q3 2026-Q2 2027	3,000
	Activity 1.1.1.4 Conduct pilot field studies (focus group discussion and semi-structured interviews) with 30 communities to identify the multi-dimensional drivers of vulnerability and risk (social, economic, ecological, cultural, political, and infrastructural determinants of vulnerability) in Bangladesh and Nepal region highly exposed to different hydrometeorological hazards	More than 50% of the consulted stakeholders are women, youths and other vulnerable groups (Baseline:10%)	PMU Technical officers	Q3 2026-Q2 2027	4,000
	Activity 1.1.1.5 Draft the field studies reports (two national level) and the GBM-atlas with the existing static information available	Draft field studies reports are validated by all stakeholders (Baseline:0)	PMU Technical officers	Q2 2027	N/A as it is related to technical reports/ desk study

Output 1.1.2 Develop capacity and awareness at the local, national and regional levels to ensure risk informed decision-making	Activity 1.1.2.1 Assess the available IT equipment (computers, servers, databases, etc.) and IT/GIS expertise at the NMHSs services and other relevant services (e.g. Geographical Institute, Disaster Management, etc.) and regional level. Purchase additional equipment if necessary	Consultation with all stakeholders including women staff of government agencies (Baseline:0)	PMU Technical officers	Q3 2026-Q1 2027	2,000
	Activity 1.1.2.2 Create the HydroSOS information exchange IT network by connecting the existing information and data available at the national and regional services	All reports include gender disaggregated data; gender analysis, and gender responsive indicators and Validation of the reports are carried out with all stakeholders including women (Baseline: limited but not zero)	PMU Technical officers, IE and EEs	Q4 2026-Q1 2027	N/A as it is related to technical reports/ desk study
	Activity 1.1.2.3 Develop the meteorological, climatological and hydrological database at the national levels and create the links with the existing databases for the collected information on hazards, vulnerabilities and exposure including the main driving hydro-meteorological parameters for floods and drought events (e.g. precipitation, evaporation, water levels, temperature, soil moisture, soil type, etc.)	Participation to the training workshops by all stakeholders including women (at least 30-40%) (Baseline:0)	Technical Partners	Q2 2027	N/A as it is related to technical reports/ desk study
	Activity 1.1.2.4 Develop web-based flood and drought risk maps for both Bangladesh and Nepal using the dynamic hydro-meteorological, environmental and static social and structural database and existing maps developed in the GBM targeted countries through the past projects (see part G for more information). The maps will be developed by 20 plus internal experts and 4 national training workshops.	A gender analysis conducted to understand how climate risks and vulnerabilities affect different genders (baseline: N/A); More than 40% participants are women and youths during consultation or training workshops (Baseline: 10%)	PMU Technical officers, IE and Ees	Q4 2026-Q2 2027	5,000
	Activity 1.1.2.5 Scenarios for socio-economic and environment development along with the climate change projections are collected and projected impacts on population, water resources, urban development, environment and	Gender-responsive budgeting principles integrated, ensuring that the budget accounts for the specific needs and	Technical Partners	Q4 2026-Q2 2027	N/A as it is related to technical reports/ desk study

	agricultural areas are analyzed for both Bangladesh and Nepal	priorities of different genders			
	Activity 1.1.2.6 Organize two national training workshops for professionals related to hydrology and meteorology, disaster management, and GIS etc. to convey knowledge and improve skills needed for using risk maps	More than 40% participants are women during consultation or training workshops (Baseline: 10%)	Technical Partners	Q4 2026-Q2 2027	3,000
	Activity 1.1.2.7 Identify and assign roles and responsibilities to the agencies and organizations forming a task team (each with 10 members) at national levels to regularly complement and improve the database and risk maps and also to monitor and report on the new updates	Gender sensitive approach will be carried out to ensure relevant stakeholders are part of task team including women (Baseline:0)	PMU Technical officers, IE and EEs	Q4 2026-Q2 2027	N/A as it is related to technical reports/ desk study
Output 1.1.3 Long term risk management strategies identified and integrated into development plans (economic, social, environmental aspects)	Activity 1.1.3.1 Design and develop the regional/national level guideline presenting the whole process of risk maps development and future impacts on various sectors with examples of implementation on highly vulnerable urbans and agricultural areas	Gender-responsive budgeting principles integrated, ensuring that the budget accounts for the specific needs and priorities of different genders within the community (baseline: N/A);	PMU Technical officers, IE and EEs	Q3-Q4 2027	N/A as it is related to technical reports/ desk study
	Activity 1.1.3.2 Develop supplementary means of communication to reach a wider population (more than 10 infographics, posters, videos, leaflets for schools, etc. are developed and shared in various social media channels and hard copy distribution in the public events)	Gender sensitive approach will be carried out to ensure needs related to all stakeholders are considered (Baseline:0)	PMU Technical officers, IE and EEs	Q3-Q4 2027	3,000
	Activity 1.1.3.3 Organize 20 local trainings and workshops with stakeholders (representatives of communities, local policymakers, and decision makers) to disseminate the information on future climate and risk changes and to obtain additional qualitative input on potential impacts for socio-economic and environmental aspects	Gender-responsive budgeting principles integrated, ensuring that the budget accounts for the specific needs and priorities of different genders within the community (baseline: N/A);	PMU Technical officers, IE and EEs	Q3-Q4 2027	5,000

	Activity 1.1.3.4 Develop safeguard action plan for risk management at medium and long term with the output from workshops and consultations with the relevant stakeholders (more than 1000 people are consulted during the workshops or interviews in the field)	Gender-responsive budgeting principles integrated, ensuring that the budget accounts for the specific needs and priorities of different genders within the community (baseline: N/A);	PMU Technical officers, IE and EEs	Q3-Q4 2027	N/A as it is related to technical reports/ desk study
<b>Outcome 1.2 Preparedness and resilience to climate change promoted through innovative and community-based initiatives.</b>					
Output 1.2.1 Implementation of community-based flood and drought management strategies in the vulnerable sites and in different ecosystems	Activity 1.2.1.1 Conduct two participative community consultations in each of 20 vulnerable sites to identify and select the appropriate local measures or equipment (non-structural preparedness tools such as early warning dissemination through loudspeakers and local radio, locally installed rain-gauge and river-gauge for hydrological data collection, marking of vulnerable houses for rapid response support, flood level marking plates to mark the previous year's floods useful for future construction of resilient houses, simulation exercises, knowledge and awareness session on disaster risk reduction, ecosystem services, climate change adaptation and drought indicators).	A gender analysis conducted to understand how climate risks and vulnerabilities affect different genders (baseline: N/A).  Gender sensitive approach will be carried out to ensure relevant stakeholders are part of task team including women (Baseline:0) More than 40% participants are women during consultation or training workshops (Baseline: 10%)	PMU Technical officers of IE and Ees and External Technical partners	Q3 2026-Q2 2027	15,000
	Activity 1.2.1.2 Develop and install the local preparedness measures (at least 5 in each vulnerable sites or communities) as identified with the communities under activity 1.2.1.1	Gender-responsive budgeting principles integrated, ensuring that the budget accounts for the specific needs and priorities of different genders within the community (baseline: N/A);	PMU Technical officers, IE and EEs	Q3 2026 -Q3 2027	3,000
	Activity 1.2.1.3 Identification of existing or development of new local flood and drought management committees or groups (at least one in each site)	Gender sensitive approach will be applied to ensure all relevant stakeholders are part of the management committees including women, youths etc.	PMU Technical officers, IE and EEs	Q3 2026 -Q4 2027	5,000

	Activity 1.2.1.4. Capacity building workshops (2 in each site) of local management committees or groups identified under activity 1.2.1.3	More than 40% participants are women during consultation or training workshops (Baseline: 10%)	PMU Technical officers, IE and EEs	Q3 2026 -Q3 2027	5,000
	Activity 1.2.1.5 Development of community-based flood and drought management manual (one for each country or one at the regional level) including safety and safeguard measures for preservation of natural habitats, land and soil conservation, biological diversity.	Gender-responsive budgeting principles integrated, ensuring that the budget accounts for the specific needs and priorities of different genders within the community (baseline: N/A);	PMU Technical officers, IE and EEs	Q3-Q4 2027	N/A as it is related to technical reports/ desk study
	Activity 1.2.1.6 Organize 20 local meetings to share knowledge and experience of added value of local measures or equipment under 1.2.1.2	More than 40% participants are women during consultation meetings (Baseline: 10%)	Technical Partners	Q4 2026-Q2 2027	5,000
Output 1.2.2 Strengthened awareness of vulnerable communities and agencies on hydro-meteorological risks through education programs including nature-based solutions and mainstreaming gender	Activity 1.2.2.1 Organize dedicated short courses (one for each country with 50 plus participants) on the IUCN standards for nature-based solutions approaches and concepts for targeted beneficiaries to disseminate knowledge on natural and nature-based solutions (NbS) for flood and drought management	More than 40% participants will be women during consultation meetings (Baseline: 0)	Technical Partners	Q2 2027 – Q3 2027	15,000
	Activity 1.2.2.2 Collect feedbacks from the workshop participants on their views and perception of NbS tools	More than 40% participants providing feedbacks during consultation meetings or training workshops will be women (Baseline: 0)	Technical Partners	Q2 2023 - Q1 2028	
	Activity 1.2.2.3 Recommend actions (one report for each national levels and one for regional level) to increase the use of natural and nature-based solutions and environmentally friendly methodologies with the involvement of local population and aligning with the Adaptation Fund ESP principles	Gender-responsive budgeting principles integrated, ensuring that the budget accounts for the specific needs and priorities of different genders within the community (baseline: N/A);	PMU Technical officers, IE and EEs	Q3-Q4 2027	
	Activity 1.2.2.4 Conduct workshops (2 in each country) to provide support for developing project proposals (submission to the internal and external agencies in future) on implementing natural and nature-based solutions for the flood and drought events.	More than 40% participants are women during consultation or training workshops (Baseline: 10%)	Technical Partners	Q1 2028	5,000

	Activity 1.2.2.5 Organize and conduct national and local workshops (5 in each country with 50 plus participants out of which 50% are female) on the Training Manual for mainstreaming gender in the End-End Early Warning System for Flood Forecasting (E2E-EWS-FF) and flood management with potential participants from NMHSs, local policymakers, civil authorities, women and community-based organizations etc.	More than 50% participants are women, youths and elderly participating to the training workshops (Baseline: 10%)	Technical Partners	Q1 2028	15,000
	Activity 1.2.2.6 Collect feedback from the workshop participants on their views and knowledge sharing on mainstreaming gender in E2E-EWS-FF and IFM with other stakeholders	More than 40% participants providing feedback during consultation meetings or training workshops will be women (Baseline: 0)	Technical Partners	Q1 2028	
	Activity 1.2.2.7 Recommend actions (one regional level report) that would improve the participation of women and other vulnerable groups into flood management and early warning	Gender-responsive budgeting principles integrated, ensuring that the budget accounts for the specific needs and priorities of different genders within the community (baseline: N/A);	PMU Technical officers, IE and EEs	Q2 2028	
<b>Outcome 2.1 A web-based Hydrological Status and Outlook System for EWS is designed and developed together with the National services</b>					
Output 2.1.1 Improved hydrological status and outlook instruments through data standardization for EWS is designed and developed	Activity 2.1.1.1 Make an inventory of the gauging stations (20 consultation meetings with hydro-met representatives at the local levels in each country) with real-time data transfer (or pseudo real-time) in the GBM Basin and prepare descriptive sheets for each station (location, equipment, data series, etc.)	Gender sensitive approach will be applied in the data collection, field visits and consultation meetings so that relevant stakeholders have their representation including women groups (Baseline:0)	PMU Technical officers of IE and EEs	Q4 2026	4,000
	Activity 2.1.1.2 Perform a field visit to 40 locations and desk study to check the availability and quality of the data and information related to runoff, rainfall and other relevant hydrometeorological and agrometeorological data and also through the flood forecasting and drought monitoring products available at each NMHSs and other relevant institutions	Gender sensitive approach will be applied in the data collection, field visits and consultation meetings so that relevant stakeholders have their representation	PMU Technical officers of IE and EEs	Q4 2026-Q1 2027	N/A as it is related to technical reports and field visits

	including women groups (Baseline:0)			
Activity 2.1.1.3 Update the database of hydro-meteorological parameters with new information, or interconnect with existing platforms mainly through WMO Hydrohub (enhancing hydrological monitoring and data exchange) and World Hydrological Observing System (WHOS) mandate of standardization of data and information management systems.	More than 40% participants are women during consultation or training workshops (Baseline: 10%)	Technical Partners	Q4 2027	5,000
Activity 2.1.1.4 Organize 3 training workshops (one each at national levels and one at the regional level) for the NMHSs staff related to data collection, calibration and maintenance of equipment following WMO standards	More than 40% participants are women during consultation or training workshops (Baseline: 10%)	Technical Partners	Q1 2028	3,000
Activity 2.1.1.5 Describe the thresholds for flood events and for drought period based on hydro-meteorological events and risk maps for various risk levels (for example, low- medium-high) through 10 consultation meetings with technical services and local representatives supported by evidence-based experiences.	More than 40% participants are women, youths and elderly participating in the training workshops or consultation meetings (Baseline: 5-10%)	Technical Partners	Q1 2028	5,000
Activity 2.1.1.6 Define the values of the thresholds for flood and for drought events, at and around each gauging station, in relationship with past events	Gender sensitive approach will be applied to consult all relevant stakeholders (Baseline:0) to gather past events related information	Technical Partners	Q1 2028	4,000
Activity 2.1.1.7 Conduct the water resources assessment in the GBM region (10 locations in the two countries) to understand the changing value of water level, water quality, in relationship with present status and past events and for developing services for hydro-power generation, agriculture, irrigation, water utility etc.	Gender sensitive approach will be applied in the data collection, field visits and consultation meetings so that relevant stakeholders have their representation including women groups (Baseline:0)	IE and Ees and Technical partners	Q4 2028	4,000

	Activity 2.1.1.8 Develop the HydroSOS products for the GBM basin (technical support to develop monthly status and outlook products and 20 training workshops at the national level) based on above defined thresholds and real time and historical information available at the National level and from Satellite based products.	Gender sensitive approach will be applied to consult all relevant stakeholders (Baseline:0)	Technical Partners	Q2 2028	20,000
	Activity 2.1.1.9 Link the thresholds of flood and drought (monthly, quarterly and half yearly scale) with the socio-economic and environmental impact at the national level and provide advisory services to various private sector entities and agencies (involved in hydro-power generation, agriculture, irrigation, water utility) improving their economical activities.	Gender sensitive approach will be applied to consult all relevant stakeholders (Baseline:0)	Technical Partners	Q2 2028	
Output 2.1.2 Existing products and tools are integrated and visualized in the regional HydroSOS for EWS	Activity 2.1.2.1 For the areas with available forecast models in the sub-basins (e.g., Ganga, Brahmaputra and Meghna basin), create the procedure to use the outputs of the existing products and models within the network of centers producing HydroSOS jointly with the NMHSs	At least 30% - 40% women and girls trained on modelling and forecasting (baseline: 0). Assumptions: Considering modelling and forecasting is a very technical field, it is assumed there are Women hydrometeorologists, modelers or forecasters similar to Men in government agencies or research institute	Technical Partners	Q4 2027- Q4 2028	15,000
	Activity 2.1.2.2 Develop software to collect the meteorological and hydrological forecasts (more than 3 to 4 forecasts are integrated) and to calculate the daily warning status or outlooks levels for each of the sub-basin and vulnerable areas	At least 30% - 40% women and girls trained on modelling and forecasting (baseline: 0). Assumptions: Considering modelling and forecasting is a very technical field, it is assumed there are Women hydrometeorologists, modelers or forecasters similar to Men in government	Technical Partners	Q4 2027- Q4 2028	

	agencies or research institute			
Activity 2.1.2.3 Design and develop the web interface to gather and visualize all individual warning levels on the main HydroSOS transboundary system	More than 40% participants are women during consultation or training workshops (Baseline: 10%) Assumptions: Considering modelling and forecasting is a very technical field, it is assumed there are Women hydrometeorologists, modelers or forecasters like Men in government agencies or research institute	Technical Partners	Q4 2026 -Q2 2029	5,000
Activity 2.1.2.4 Prepare user guide (at national level with local languages) to convey all available knowledge on the interface to the various groups of users (forecasters, IT staff, decision-makers, etc.) and develop sector specific DSS contents to be disseminated to various stakeholders	Gender sensitive approach will be applied to collect feedback and incorporate needs of all relevant stakeholders including women (Baseline:0)	Technical Partners	Q2 2029	2,000
Activity 2.1.2.5 Carry out 3 national and regional trainings and capacity development workshops with the NMHS professionals, local/national agencies and users of the web based EWS and water resources management for using Hydro SOS.	More than 40% participants are women, youths and elderly participating in the training workshops or consultation meetings (Baseline: 5-10%)	Technical Partners	Q1 2028	5,000
Activity 2.1.2.6 Gather feedbacks, suggestions and scope for improvements from the workshop participants	More than 40% participants providing feedbacks during training workshops will be women (Baseline: 0)	Technical Partners	Q2 2029	

	Activity 2.1.2.7. In Bangladesh and Nepal, upgrade the integrated water resource management strategies based on the advisories provided to various agencies on sub-seasonal and seasonal related outlooks for hydrological services	Gender sensitive approach will be applied to gather feedback and incorporate needs of all relevant stakeholders including women (Baseline:0)	Technical Partners	Q2 2029	3,000
	Activity 2.1.2.8. Organize 2 regional workshops (with more than 30 participants out of which 40% are female) to share experiences on risk maps and hydro-SOS EWS with other GBM countries	More than 40% participants are women and youths participating in the training workshops (Baseline: 5-10%)	Technical Partners	Q1 2028	3,000
Output 2.1.3 Establishment of Hydro-Climate Outlook Forums at the regional level	Activity 2.1.3.1 Identify the linkages with the existing regional Climate Outlook forum disseminating the information available with the HydroSOS BaNe system	Gender-sensitive budgeting principles integrated, ensuring that the budget accounts for the specific needs and priorities of different vulnerable groups (baseline: N/A);	PMU Technical officers, IE and EEs	Q2 2028	16,000
	Activity 2.1.3.2 Nominate at least 10 members for Hydrological outlook group which could be merged with the climate outlook forum at the regional level	More than 40% participants are women, youths and elderly participating in the training workshops (Baseline: 5-10%)	Technical Partners	Q1 2028	
	Activity 2.1.3.3 Organize 4 annual regional Hydro-climate outlook meetings at each country with the existing and nominated members	More than 40% participants are women and youths participating in the consultation workshops (Baseline: 5-10%)	Technical Partners	Q4 2026 -Q2 2030	
	Activity 2.1.3.4 Develop national and regional guidance documents for regular coordination and meetings with the Hydro-climate outlook members	Gender-sensitive principles integrated, ensuring the specific needs and priorities of different vulnerable groups are considered (baseline: N/A);	PMU Technical officers, IE and EEs	Q2 2030	
Outcome 2.2 Development of medium and long-term concrete adaptation measures in the prioritized areas and updates based on lessons learned and monitoring instruments					

Output 2.2.1 EWS and testing of identified adaptation measures in selected vulnerable communities.	Activity 2.2.1.1 Discuss the selection of the 10 pilot tests areas with the concerned agencies and communities (10 meetings) on the basis of the list presented in Table 4 whether it is still applicable for the testing of the HydroSOS EWS during monsoon and dry season.	Gender-sensitive principles integrated, ensuring the specific needs and priorities of different vulnerable groups are considered (baseline: N/A);	PMU Technical officers, IE and EEs	Q3 2027	5,000
	Activity 2.2.1.2 Organize meetings on each of the pilot sub-areas (30 locations in total) to identify the roles and responsibilities of the different groups of stakeholders during the tests and present the coordination and collaboration mechanism enabling first responders to receive and use efficiently the HydroSOS early warning information	More than 40% participants are women, youths and elderly participating in the training workshops or consultation meetings (Baseline: 5-10%)	Technical Partners	Q3 2027-Q2 2028	20,000
	Activity 2.2.1.3 Identify the good practices, challenges and limitations of products and services during the Flood and Drought events at each of the 10 pilot testing locations (conduct 2 meetings at each site)	Gender-sensitive principles integrated, ensuring the specific needs and priorities of different vulnerable groups are considered (baseline: N/A);  More than 40% participants are women and youths participating in the consultation meetings to collect good practices, challenges and limitations based on implementation of activity 2.2.1.2 (Baseline: 5-10%)	PMU Technical officers, IE and EEs	Q3 2027	5,000
	Activity 2.2.1.4 Raise awareness about the pilot testing using multi-media channels (develop one video for each country)	More than 40% participants are women, youths and elderly participating in the awareness raising campaigns (Baseline: 5-10%) A gender specific focal point for each region to ensure application of knowledge and skills (Baseline: N/A)	PMU Technical officers, IE and EEs	Q3-Q4 2028	2,000

	Activity 2.2.1.5 Develop the national level action plan (2 in total) to further improve products and services after the pilot testing	Gender-sensitive principles integrated, ensuring the specific needs and priorities of different vulnerable groups are considered (baseline: N/A);	PMU Technical officers, IE and EEs	Q3 – Q4 2028	3,000
Output 2.2.2 Coordination and collaboration developed at the regional, national and local level	Activity 2.2.2.1 Organize 4 national consultative workshops (participants from local/national agencies involved in Floods and Drought management) to share the knowledge (new methodologies, concepts and tools for effective forecasting and dissemination of early warnings) from the pilot tests	More than 40% participants are women, youths and elderly participating in the consultative workshops (Baseline: 5-10%)	PMU Technical officers, IE and EEs	Q3-Q4 2029	5,000
	Activity 2.2.2.2 Based on pilot testing, update/develop coordination and collaboration guidelines (one for each country) linking with the standard operating procedures (SOP) for jointly preparing and responding to future flood and drought events	Gender-sensitive principles integrated, ensuring the specific needs and priorities of different vulnerable groups are considered (baseline: N/A);  50% participants are women and youths participating in the consultation meetings to collect evidence-based examples on coordination and collaboration for updating SOPs on implementation of activity 2.2.2.1 (Baseline: 5-10%)	PMU Technical officers, IE and EEs	Q3 2027	3,000
Output 2.2.3 Decision-makers are informed with key water resources management parameters for current status and sub-seasonal and seasonal outlooks	Activity 2.2.3.1 Describe the network of the relevant policymakers (at least 10 from each country) responsible for flood and drought management as well as other related fields (water resources, health, agriculture, ecosystem, forestry, soil and land management.) through national consultation meetings.	Gender-sensitive principles integrated, ensuring the specific needs and priorities of different vulnerable groups are considered (baseline: N/A); Ensure at least 50% representation of women and youths (Baseline: 5%-10%)	PMU Technical officers and technical partners	Q3-Q4 2027	1,000

	Activity 2.2.3.2 Organize and conduct 4 national workshops in total to identify the gaps and needs in existing policies and plans with special attention on safeguard actions for minimizing direct and indirect risks arising from the project activities, and to highlight the key long-term strategies for water resources management especially for flood current status and sub-seasonal to seasonal drought outlook	More than 40% participants are women, youths and elderly participating in the workshops or consultation meetings (Baseline: 5-10%)	Technical Partners	Q3 2026-Q1 2029	6,000
	Activity 2.2.3.3 Present the recommendations to the concerned decision-makers at the national level through a national workshop in each country	Gender-sensitive principles integrated, ensuring the specific needs and priorities of different vulnerable groups are considered (baseline: N/A); Ensure at least 40% representation of women (Baseline: 5%-10%)	PMU Technical officers and Technical partners	Q3-Q4 2029	1,000
<b>Component 3: Water and climate resilient regional cooperation arrangements together with National and regional stakeholders, and community involvement</b>					
<b>Outcome 3.1 Improve information base and practices related to water resource management and climate change adaptation</b>					
Output 3.1.1 Best practices and experience from other region and river basins are made to ensure that existing national policies and practices are interoperable in GBM river basin cooperation framework	Activity 3.1.1.1 Conduct a desk study, and hold 10 meetings with stakeholders, to identify the status of climate and future socio-economic changes in the transboundary governance plans, policies and guidelines for flood and drought management in Bangladesh and Nepal	A gender analysis conducted to understand how climate risks and vulnerabilities affect different genders (baseline: N/A); Gender sensitive approach will be carried out to ensure relevant stakeholders are part of meetings including women (Baseline:0) More than 40% participants are women during consultation meetings (Baseline: 10%)	PMU Technical officers of IE and Ees and External Technical partners	Q2 2027	3,000

Activity 3.1.1.2 Develop 3 short reports (one for the country and one at the regional level) underlining the strengths together with the identified gaps and additional needs related to climate and development impacts in the GBM regional	Gender-sensitive principles integrated, ensuring the specific needs and priorities of different vulnerable groups are considered (baseline: N/A); Ensure at least 40% representation of women (Baseline: 5%-10%)	PMU Technical officers and Technical partners	Q3-Q4 2027	1,000
Activity 3.1.1.3 Organize and conduct national (4 in total) and 2 regional workshops to review, propose update and implementation arrangements on existing plans, policies and guidelines on water resources management and climate change adaptation in the GBM Basin.	More than 40% participants are women, youths and elderly participating in the workshops or consultation meetings (Baseline: 5-10%)	Technical Partners	Q3 2028-Q2 2029	5,000
Activity 3.1.1.4 Develop and propose long-term actions (through one national workshop and one regional workshop) for strengthening resilience and capacities at transboundary, national and local levels to be implemented by NMHSs and the other regional agencies	Gender-sensitive principles integrated, ensuring the specific needs and priorities of different vulnerable groups are considered (baseline: N/A); Ensure at least 40% representation of women (Baseline: 5%-10%)	PMU Technical officers and Technical partners	Q3-Q4 2027	4,000
Activity 3.1.1.5 Collect feedback, suggestions and recommendations from the workshop participants on the links between activities of National Programmes	More than 40% participants providing feedbacks during consultation meetings or training workshops will be women (Baseline: 0)	Technical Partners	Q1 2028	3,000
Activity 3.1.1.6 Identify roles and responsibilities of the individual organizations and define the coordination mechanism to improve the implementation of water resources management and climate change adaptation measures	Gender-sensitive principles integrated, ensuring the specific needs and priorities of different vulnerable groups are considered (baseline: N/A); Ensure at least 40% representation of women in the decision-making	PMU Technical officers and Technical partners	Q3-Q4 2028	2,000

		process (Baseline: 5%-10%)			
Output 3.1.2 Analysis and optimization of benefits of regional water and climate adaptation action.	Activity 3.1.2.1 Conduct a total of 10 consultation meetings with national stakeholders to gather examples of best practices and approaches for water resources management, flood and drought risks reduction and climate adaptation related measures	Gender-sensitive principles integrated, ensuring the specific needs and priorities of different vulnerable groups are considered (baseline: N/A); Ensure at least 40% representation of women (Baseline: 5%-10%)	PMU Technical officers and Technical partners	Q1 2027-Q3 2027	10,000
	Activity 3.1.2.2 Draft reports for each consultation locations (under activity 3.1.2.1) on recommendations for improving regional water and climate adaptation action.	Gender-sensitive principles integrated, ensuring the specific needs and priorities of different vulnerable groups are considered (baseline: N/A); Ensure at least 40% representation of women in the decision-making process (Baseline: 5%-10%)	PMU Technical officers and Technical partners	Q3-Q4 2028	3,000
	Activity 3.1.2.3 Organize the dissemination (through a national workshop in each country and 1 at the regional level with 50 participants out of which 50% are female) of the report to policymakers and decision-makers	More than 40% participants are women, youths and elderly participating in the dissemination events or awareness raising (Baseline: 5-10%)	PMU Technical officers, IE and EEs	Q3-Q4 2029	3,000
Outcome 3.2 National adaptation strategies (i.e. NAPs) are fully inclusive of water management issues, address community concerns. Methodology and mechanism for leveraging and sharing benefits of optimizing adaptation at regional level are in place.					
Output 3.2.1 An inclusive process is developed to ensure that National adaptation strategies explicitly address water-relevant	Activity 3.2.1.1 Prepare/suggest updating of framework (1 each at national level and 1 at the regional level) for adapting the National adaptation strategies with safeguard actions on long term water resources management, climate change adaptation and disaster risk reduction with local stakeholders	Gender-sensitive principles integrated, ensuring the specific needs and priorities of different vulnerable groups are considered (baseline: N/A);	PMU Technical officers and Technical partners	Q3-Q4 2028	3000

instruments and strategies. Inclusive approaches are operational to include local communities.		Ensure at least 40% representation of women in the decision-making process (Baseline: 5%-10%)			
	Activity 3.2.1.2 Conduct community-based workshops (10 each at the national level and 3 at the regional level to share results) with agencies, local communities/ organizations and other relevant stakeholders to identify and prioritize adaptation measures	Ensure at least 40% representation of women in the workshops and decision-making process (Baseline: 5%-10%)	PMU Technical officers and Technical partners	Q3-Q4 2028	5,000
	Activity 3.2.1.3 Collect feedback, suggestions and recommendations	More than 40% participants providing feedback during workshops will be women (Baseline: 0)	Technical Partners	Q1 2029	
	Activity 3.2.1.4 Propose national and local level action plans at local and national levels to review and improve the National Adaptation strategies together with the local communities	Gender-sensitive principles integrated, ensuring the specific needs and priorities of different vulnerable groups are considered (baseline: N/A); Ensure at least 40% representation of women in the decision-making process (Baseline: 5%-10%)	PMU Technical officers and Technical partners	Q3-Q4 2029	4,000
Output 3.2.2 Regional mechanism for adaptation cooperation on HydroSOS established and operational. Periodic review and update of the mechanism is agreed on by riparian states.	Activity 3.2.2.1 Organize and conduct workshops (10 at the national levels and two at the regional levels) to disseminate the results of Hydro-SOS EWS and associated products on climate adaptation for the GBM	Ensure at least 40% representation of women in the workshops (Baseline: 5%-10%)	PMU Technical officers and Technical partners	Q3-Q4 2028	10,000
	Activity 3.2.2.2 Collect feedback, suggestions and recommendations from the workshop participants on the links between activities of National Programmes and the HydroSOS-BaNe project	More than 40% participants providing feedbacks during workshops will be women following the implementation of 3.2.2.1 (Baseline: 0)	Technical Partners	Q1 2029	

	Activity 3.2.2.3 Identify roles and responsibilities of the individual agencies or organizations at the 10 locations and define the coordination mechanism to review and update the implementation of the climate change adaptation measures based on good practices identified in the GBM riparian countries.	Gender-sensitive principles integrated, ensuring the specific needs and priorities of different vulnerable groups are considered (baseline: N/A); Ensure at least 40% representation of women in the decision-making process (Baseline: 5%-10%)	PMU Technical officers and Technical partners	Q2-Q3 2030	3,000
Total costs for GAP implementation					300,000

**Annex 5: Consultation with the national partners of the two countries to understand the roles and responsibilities at the national level**

**Consultation with the National Partners to fulfill the tasks of the HydroSOS-GBM Project in the preparation phase by WMO and NMHSs of the GBM countries to be submitted to the Adaptation Fund**

**Written by: Bangladesh Delegates**

DDM: Dept. of Disaster Management  
 DAE: Dept of Agriculture Extension  
 BWDB: BANGLADESH WATER DEVELOPMENT BOARD  
 BMD: BANGLADESH METEOROLOGICAL DEPARTMENT  
 WARPO: WATER RESOURCE PLANNING ORGANIZATION

Expected outcomes	Planned activities	Concerned country: BANGLADESH		Remarks/comments regarding existing projects or available resources
		Main Contributing Agency	Need of Support	
For more details see pre-concept note				
1.1 Development of Flood and Drought risk maps	<ul style="list-style-type: none"> <li>Inventory of Vulnerability, capacity, exposure, and risk (VCER) for flood and drought events</li> </ul>	DDM, BWDB, DAE	YES	
		BMD, BWDB, DDM	YES	
	<ul style="list-style-type: none"> <li>Hazard maps (with return periods)</li> </ul>	BWDB, BMD, DDM, DAEA BWDB and BMD	YES	
	<ul style="list-style-type: none"> <li>Database</li> </ul>			
	<ul style="list-style-type: none"> <li>Capacity development</li> </ul>			
1.2 Climate scenarios	<ul style="list-style-type: none"> <li>Inventory of climate information and scenarios</li> </ul>	DOE, BMD	YES	
	<ul style="list-style-type: none"> <li>Consultation to define the impacts of climate variability on the risk indicators (population, agriculture, irrigation, water resources, infrastructures etc.)</li> </ul>	DOE, DDM, BWDB	YES	
1.3 Long-term Risk Management Strategies	<ul style="list-style-type: none"> <li>Guidance document</li> </ul>	DDM, BWDB	YES	
	<ul style="list-style-type: none"> <li>Capacity development</li> </ul>	DDM, BWDB	YES	
1.4 Community-based flood and drought management	<ul style="list-style-type: none"> <li>Self-help capacities and preparedness measures for floods</li> </ul>	BWDB, DAE, NGO	YES	

	and drought management in the communities			
1.5 Capacity development related to Nature-based solutions to flood and drought management	Nature-based solutions related training will be delivered	BWDB, DAE	YES	
2.1 web-based HydroSOS and Early warning systems	<ul style="list-style-type: none"> <li>• Inventory of Hydro-meteo data and sharing with the product and services development</li> <li>• Creation of the operational center and connections to the national services</li> <li>• Development of warning Thresholds</li> <li>• Procedure for defining impact-based forecasts</li> <li>• Water resources assessment and management</li> <li>• Design and development of web-based HydroSOS-GBM platform</li> <li>• Establishment of hydro-climate outlooks forum at the regional level</li> </ul>	<p>BMD, BWDB</p> <p>BMD, BWDB, DAE</p> <p>BWDB, DAE</p> <p>BWDB, DAE</p> <p>BWDB</p> <p>BWDB, DAE, BMD</p> <p>BMD, BWDB</p>	YES	
2.2 Demonstration of HydroSOS-EWS on the pilot sites	<ul style="list-style-type: none"> <li>• Awareness meeting</li> <li>• Perform testing during monsoon and dry season in 8-10 sites (see map and site details on the pre-concept note)</li> </ul>	<p>DDM, DAE</p> <p>BMD, BWDB</p>	YES	
2.3 Awareness through Education Programs	<ul style="list-style-type: none"> <li>• Workshop on mainstreaming Gender in E2E-EWS-FF and IFM</li> </ul>	DDM, DAE	YES	
3.1 Policy and Institutional strengthening	<ul style="list-style-type: none"> <li>• Review of policies and plans</li> <li>• Awareness at the transboundary, national and local levels</li> </ul>	WARPO, WMO BWDB	YES	
3.2 Long term impact at national and regional level	<ul style="list-style-type: none"> <li>• Linkage with national climate adaptation</li> </ul>	DOE, WMO	YES	

	plans (NAPA, NDC, NAP) and transboundary action plan <ul style="list-style-type: none"> <li>• Capacity development of the policy makers</li> </ul>	WMO		
3.3 Awareness at local level	<ul style="list-style-type: none"> <li>• Organize community consultation with the civil society</li> <li>• Develop a framework of actions</li> </ul>	NGO, DDM, DAE WMO	YES	
Regional water resources policy and plans linking with socio-economic benefits	Review, update or new development of the policies			

**Consultation with the National Partners to fulfill the tasks of the HydroSOS-BaNe Project  
Project in the preparation phase by WMO and NMHSs of the GBM countries to be submitted to the  
Adaptation Fund**

Written by: Nepalese Delegates

Expected outcomes	Planned activities	Concerned country: Nepal		Remarks/comments for existing projects or available resources
For more details see pre-concept note		Main Contributing Agency	Need of Support	
1.1 Development of Flood and Drought risk maps	<ul style="list-style-type: none"> <li>• Inventory of Vulnerability, capacity, exposure and risk (VCER) for flood and drought hazard</li> <li>• Database</li> <li>• Capacity development</li> <li>• Communication tools</li> </ul>	NDARMA DWRI DHM  DHM  DHM, NDRRMA		All form of software and hardware capacity building
1.2 Climate scenarios	<ul style="list-style-type: none"> <li>• Inventory of climate information and scenarios</li> <li>• Consultation to define the impacts of climate variability on the risk maps</li> </ul>	MOFE  MDFE and aDHM		
1.3 Long-term Risk management strategies	<ul style="list-style-type: none"> <li>• Guidance document</li> </ul>	MOHA, MOFE, MOEWRI  NDRRMA, DHM		

	<ul style="list-style-type: none"> <li>Capacity development</li> </ul>			
1.4 Community-based flood and drought management	<ul style="list-style-type: none"> <li>Self-help capacities and preparedness to floods and droughts in the communities</li> </ul>	DHM, NDRRMA INGO. Local Govt.		
1.5 Capacity development related to Nature-based solutions to flood and drought management				
2.1 web-based HydroSOS and Early warning systems	<ul style="list-style-type: none"> <li>Inventory of Hydro-meteo data and sharing with the product and services development</li> <li>Creation of the operational centre and connections to the national services</li> <li>Development of warning Thresholds</li> <li>Procedure for defining impact-based forecasts</li> <li>Water resources assessment and management</li> <li>Design and development of web-based HydroSOS-GBM platform</li> <li>Establishment of hydro-climate outlooks forum at the regional level</li> </ul>	DHM  MOHA-NDRRMA  DHM  DHM, NDRRMA  MOENRI, WECS  DHM+NDRRMA  DHM+NDRRMA		
2.2 Demonstration of HydroSOS-GBM on the pilot sites	<ul style="list-style-type: none"> <li>Awareness meeting</li> <li>Perform testing during monsoon and dry season in 8-10 sites (see map and site details on</li> </ul>	DHM+NDRRMA DHM		

	the pre-concept note)			
2.3 Awareness through education programs	<ul style="list-style-type: none"> <li>Workshop on mainstreaming Gender in E2E-EWS-FF and IFM</li> </ul>	MOE, MOEWRI, DHM, NDRRMA, INGO'S, Local Govt.		
3.1 Policy and Institutional strengthening	<ul style="list-style-type: none"> <li>Review of policies and plans</li> <li>Awareness at transboundary, national and local levels</li> </ul>	MOEWRI, MOHA MOFE, Local Govt.		
3.2 Long term impact at national and regional level	<ul style="list-style-type: none"> <li>Linkage with national climate adaptation plans (NAPA, NDC, NAP) and transboundary action plan</li> <li>Capacity development of the policy makers</li> </ul>	MOFE, MOEWRI, MOHA  DHM, NDRRMA, DWRI		
3.3 Awareness at local level	<ul style="list-style-type: none"> <li>Organize community consultation with the civil society</li> <li>Develop a framework of actions</li> </ul>	MOFAGA, MOEWRI, IHM  MOHA, NDRRMA		
Regional water resources policy and plans linking with socio-economic benefits	<ul style="list-style-type: none"> <li>Review, update or new development of the policies</li> </ul>			

Note: Any other activities left out, will be communicated during the letter stage of concept note preparation.

DHM: Dept. of Hydrology and Meteorology

NDRRMA: National Disaster Risk Reduction and Management Authority

MOEWRI: Ministry of Energy Water Resource and Agriculture

MOFE: Ministry of Forest and Environment

MOHA: Ministry of Home Affairs

DWRI: Dept of Water Resource and Irrigation

WECS: Water and Energy Commission Secretariat

MOE: Ministry of Education

MOF: Ministry of Finance

MOFAGA: Ministry of Federal Affairs and General Administration

## Annex 6: Commitment letters for Long-term Sustainability of HydroSOS Early Warning System (EWS)



Date.....

Dr Petteri Taalas  
Secretary-General  
World Meteorological Organization  
7bis Avenue de la Paix  
Case postale 2300 Nations,  
1211 Geneva

**Subject: Endorsement and commitment to provide operational support for the HydroSOS Early Warning Systems to be developed under the project 'Hydrological Status and Outlook system in the Ganga Brahmaputra Meghna Basin (HydroSOS- GBM)'**

We would like to confirm the endorsement and commitment of the National Meteorological and Hydrological Services (NMHSs) of Bangladesh participation in all HydroSOS project development activities aiming towards the achievement of the HydroSOS project objectives to the benefit of Bangladesh and the Ganga Brahmaputra Meghna region as a whole.

We request WMO as the Implementing entity of the proposed regional project to submit the HydroSOS project pre-concept note to the Adaptation Fund during January 2022 for funding.

The NMHSs is committed to provide during the project development, implementation and after its completion meteorological, hydrological and climatological data from its existing network of observation stations and related information required for the sustainable operation of the HydroSOS Early Warning System. The NMHSs will also provide in-kind support (staff and resources) to complete additional activities under the proposed project such as community-based activities, development of flood and drought risks maps and how they are impacted by climate scenarios.

The NMHSs will ensure that the resources and information are made available to World Meteorological Organization solely for the purpose of development, operation and maintenance of the HydroSOS Early Warning System. We may also apply the developed products and approaches advanced with this early warning system to basins outside the Ganga Brahmaputra Meghna.

Sincerely,

Signature and stamp

Fazlur Rashid  
Director General  
Bangladesh Water Development Board

Signature and stamp

Md. Azizur Rahman  
Director  
Bangladesh Meteorological Department

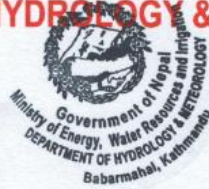


**Government of Nepal**  
**Ministry of Energy, Water Resources and Irrigation**  
**DEPARTMENT OF HYDROLOGY & METEOROLOGY**



Ref No.: 30-2079/80

Dr Petteri Taalas  
 Secretary-General  
 World Meteorological Organization  
 7bis Avenue de la Paix  
 Case postale 2300 Nations,  
 1211 Geneva



Date: 19<sup>th</sup> July, 2022

**Subject: Endorsement and commitment to provide operational support for the HydroSOS Early Warning Systems to be developed under the project 'Hydrological Status and Outlook system in the Ganga Brahmaputra Meghna Basin (HydroSOS-GBM)'**

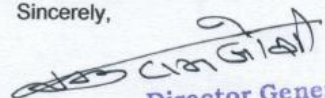
We would like to confirm the endorsement and commitment of the National Meteorological and Hydrological Services (NMHSs) of NEPAL participation in all HydroSOS project development activities aiming towards the achievement of the HydroSOS project objectives to the benefit of NEPAL and the Ganga Brahmaputra Meghna region as a whole.

We request WMO as the Implementing entity of the proposed regional project to submit the HydroSOS project pre-concept note to the Adaptation Fund during August 2022 for funding.

The NMHSs (DEPARTMENT OF HYDROLOGY AND METEOROLOGY) of NEPAL is committed to provide during the project development, implementation and after its completion meteorological, hydrological and climatological information or related products from its existing network of observation stations for the sustainable operation of the HydroSOS Early Warning System. The NMHSs will also provide in-kind support (staff and resources) to complete activities under the proposed HydroSOS GBM project including community-based activities, development of flood and drought risks maps and how they are impacted in the projected climate scenarios.

The NMHSs will ensure that the resources and information are made available to World Meteorological Organization solely for the purpose of development, operation and maintenance of the HydroSOS Early Warning System. We may also apply the developed products and approaches advanced with this early warning system to basins outside the Ganga Brahmaputra Meghna.

Sincerely,

  
 Director General

Kamal Ram Joshi  
 Director General  
 Department of Hydrology and Meteorology, Nepal

CC: Ministry of Energy, Water Resources and Irrigation

Support Letter from ICIMOD



Pema Gyamtsho  
Director General

05 July 2024

**Dr. Stefan Uhlenbrook**  
Director  
Hydrology, Water and Cryosphere  
World Meteorological Organization  
7bis Avenue de la Paix Case Postale 2300 Nations, 1211 Geneva

**Subject: Support letter to provide regional coordination and operational support for the project 'Hydrological Status and Outlook System in Bangladesh and Nepal (HydroSOS- BaNe)'**

Dear Dr. Uhlenbrook,  
Greetings from ICIMOD!

The International Centre for Integrated Mountain Development (ICIMOD) is a regional intergovernmental learning and knowledge-sharing centre serving the eight regional member countries of the Hindu Kush Himalayas – Afghanistan, **Bangladesh**, Bhutan, China, India, Myanmar, **Nepal**, and Pakistan. ICIMOD supports the region through partnerships with regional and global partners, facilitates the exchange of experiences, and serves as a regional knowledge hub to enable mountain people to adapt to climate and socio-economic changes occurring globally and in the HKH region ICIMOD has the mandate and responsibility to support member countries in strengthening their climate resilience especially developing and sharing knowledge products that drives regional policy and action plans.

ICIMOD is informed about the development of the HydroSOS-BaNe project in the two regional member countries, Bangladesh and Nepal.


With this support letter, ICIMOD (an accredited AF entity) provides its support and commitment to participate in the development (and later execution) of the HydroSOS-BaNe project mainly leading the regional cooperation and coordination activities together with the National Meteorological and Hydrological Services (NMHSs) of Bangladesh and Nepal to ensure long term sustainability of the developed tools and products through the project. The products and approaches developed by this project may also be outscaled by other member countries of the Hindu Kush Himalaya region.

**Dr. Mandira Singh Shrestha, Senior Water Resources Specialist**, will serve as the ICIMOD focal point for the HydroSOS BaNe project.

Sincerely,

Pema Gyamtsho, Ph.D.  
Director General


**Annex 7:** NDA support Letter for having WMO as one of the executing entities and specific execution support during the HydroSOS BaNe project implementation



Ref.No. 15

**Government of Nepal**

**Ministry of Forests and Environment**



Government of Nepal  
Ministry of Forest and Environment  
Singha Durbar, Kathmandu

**P.O. Box No.3987**  
**Singha Durbar, Kathmandu**

**Date:-** 3<sup>rd</sup> August, 2023

To: The Adaptation Fund Board  
c/o Adaptation Fund Board Secretariat  
Email: Secretariat@Adaptation-Fund.org  
Fax: 202 522 3240/5

**Subject: Agreement on the implementation of HydroSOS BaNe project by the WMO together with the Bangladesh Meteorological Department (BMD), Bangladesh Water Development Board (BWDB), and Department of Hydrology and Meteorology of Nepal**

Dear Adaptation Fund Secretariat,

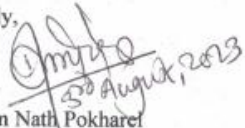
As the Designated Authority for Nepal. I would like to present my compliments to the Secretariat.

I am writing this letter to endorse the change requested by the Implementing and Executive Partners regarding the Executing Entities responsible for the implementation of the regional project " **Hydrological Status and Outlook system for integrated water resources management and climate resilience in Bangladesh and Nepal (HydroSOS-BaNe)** " that WMO is also executing the project in Bangladesh and Nepal.

The Designated Authority was informed about the need to officially submit an endorsement letter in order to formalize the change and to obtain the approval by the Project and Programme Review Committee (PPRC) and the Adaptation Fund Board, and would like to state that such change does not represent any inconvenience but represents, in fact, the best solution to ensure continuity and quality implementation of the project activities at the regional, national and local levels, considering the limited capacity of the Bangladesh Meteorological Department (BMD), Bangladesh Water Development Board (BWDB), and Department of Hydrology and Meteorology of Nepal to execute the activities at the national and regional level. Also, WMO being a United Nations specialized agency has several advantages such as VAT exemption during the procurement of goods and services, expertise and availability of technical tools and products etc. which will be instrumental in the execution of the project activities.

I trust that you will look on this endorsement favorably.

Sincerely,



3<sup>rd</sup> August, 2023

**Mr. Yam Nath Pokharel**  
**Designated Authority, Adaptation Fund**  
Position: Under Secretary (Technical)  
Head, Adaptation Section  
Climate Change Management Division  
Ministry of Forests and Environment, Government of Nepal  
Singhadurbar, Kathmandu, Nepal  
Tel: +977 14211996, Mobile: +977-9851112634  
Email: [ynpokharel@gmail.com](mailto:ynpokharel@gmail.com)  
Web: <https://mofe.gov.np/>

সচিব  
পরিবেশ, বন ও জলবায়ু পরিবর্তন মন্ত্রণালয়  
গণপ্রজাতন্ত্রী বাংলাদেশ সরকার  
বাংলাদেশ সচিবালয়, ঢাকা-১০০০



**Secretary**  
Ministry of Environment, Forest and  
Climate Change  
Govt. of the People's Republic of Bangladesh  
Bangladesh Secretariat, Dhaka-1000

**Annex 1: Request for Change in Project Execution Arrangements: HydroSOS Bane Project (Bangladesh and Nepal)**

To: The Adaptation Fund Board  
c/o Adaptation Fund Board Secretariat  
Email: Secretariat@Adaptation-Fund.org  
Fax: 202 522 3240/5

Record No.00.0000.067.019.17.part(1).155

Date: 20 July 2023

Subject: Agreement on the implementation of HydroSOS BaNE project by the WMO together with the Bangladesh Meteorological Department (BMD), Bangladesh Water Development Board (BWDB), and Department of Hydrology and Meteorology of Nepal

Dear Adaptation Fund Secretariat,

As the Designated Authority for Bangladesh. I would like to present my compliments to the Secretariat.

I am writing this letter to endorse the change requested by the Implementing and Executive Partners regarding the Executing Entities responsible for the implementation of the regional project " Hydrological Status and Outlook system for integrated water resources management and climate resilience in Bangladesh and Nepal (HydroSOS-BaNe) " that WMO is also executing the project in Bangladesh and Nepal.

The Designated Authority was informed about the need to officially submit an endorsement letter in order to formalize the change and to obtain the approval by the Project and Programme Review Committee (PPRC) and the Adaptation Fund Board, and would like to state that such change does not represent any inconvenience but represents, in fact, the best solution to ensure continuity and quality implementation of the project activities at the regional, national and local levels, considering the limited capacity (technical and human) of the Bangladesh Meteorological Department (BMD), Bangladesh Water Development Board (BWDB), and Department of Hydrology and Meteorology of Nepal to execute the activities at the national and regional level. Also, WMO being an United Nations specialized agency has several advantages such as VAT exemption during the procurement of goods and services, expertise and availability of technical tools and products etc. which will be instrumental in the execution of the project activities.

Sincerely,

*Signature of Dr. Farhina Ahmed*  
20.07.2023

Dr. Farhina Ahmed  
Secretary

Ministry of Environment, Forest and Climate Change  
and  
Designated authority for the Adaptation Fund in Bangladesh